



701 8th Street, NW, Suite 450, Washington, D.C. 20001

PHONE 202.545.4000 FAX 202.545.4001

GrowthEnergy.org

July 5, 2018

By Electronic Mail

Clerk of the Board

California Air Resources Board

1001 I Street, 23rd Floor

Sacramento, California 95812

Re: Proposed Amendments to the June 20, 2018, Notice of Public Availability of Modified Text and Availability of Additional Documents and Information for the California Low Carbon Fuel Standard Regulation and to the Regulation on Commercialization of Alternative Diesel Fuels

Dear Madam:

Growth Energy, an association of the nation's leading ethanol manufacturers and other companies who serve the nation's need for alternative fuels, is submitting to you the enclosed materials in response to proposed amendments to the June 20, 2018, Notice of Public Availability of Modified Text and Availability of Additional Documents and Information for the California Low-Carbon Fuel Standard Regulation and the Regulation on the Commercialization of Alternative Diesel Fuels. These materials also include environmental comments being submitted to the Air Resources Board and the Executive Officer pursuant to the California Environmental Quality Act and the Board's implementing regulations.

Growth Energy may file additional materials in one or both rulemaking files for consideration in connection with this agenda item at a later time, as permitted by the California Government Code and the Public Resources Code.

If there are logistical questions concerning these submittals, please contact Mr. John P. Kinsey of Wanger Jones Helsley PC at 559-233-4800.

Thank you for your consideration and assistance.

Sincerely

Chris Bliley

Vice President of Regulatory Affairs

Growth Energy

**STATE OF CALIFORNIA
AIR RESOURCES BOARD**

**PROPOSED AMENDMENTS TO THE LOW CARBON FUEL STANDARD REGULATION
AND TO THE REGULATION ON COMMERCIALIZATION OF ALTERNATIVE DIESEL
FUELS**

**GROWTH ENERGY'S RESPONSE
TO THE NOTICE OF PUBLIC AVAILABILITY OF MODIFIED TEXT AND
AVAILABILITY OF ADDITIONAL DOCUMENTS AND INFORMATION DATED JUNE 20, 2018**

JULY 5, 2018

For further information contact:
Mr. Chris Bliley
Vice President of Regulatory Affairs
Growth Energy
CBliley@growthenergy.org
202-545-4000

TABLE OF CONTENTS

	<u>Page</u>
I. The CI Values for Corn Ethanol, Cane Ethanol, and Electricity should be Based on the Best Available Economic and Scientific Information	3
A. Calculation of Direct Emissions from Corn Ethanol & Sugarcane Ethanol [CA-GREET 3.0]	4
B. Calculation of Indirect Land Use Emissions to Reflect Current GTAP	5
C. Treatment of Electricity under the LCFS Regulation	6
II. Treatment of Infrastructure Capacity Credits	7
A. If CARB Issues Credits for Electricity and Hydrogen Capacity, it should also Issue Credits for Biofuel Infrastructure	7
B. The Proposed Amendments and the EA Should Receive Additional Public Comment	7
1. The Proposed Modifications Are Not Sufficiently Related to the Original Text of the Proposed Amendments	7
2. The Proposed Modifications Constitute “Significant New Information” and Render the Project Description Unstable	12
a. The Proposed Modifications Constitute “Significant New Information” under Section 15088.5 of the CEQA Guidelines	12
b. The Project Description is Unstable Because the EA Evaluates a Different Project than what is now Being Proposed	18
C. The Proposed Modifications are Inconsistent with CARB’s Defined Project Objectives, AB 32, and SB 32	19
D. CARB Should Adopt the E15 Alternative Instead of the Proposed Modifications	21
E. The SRIA Should Be Augmented to Address Impacts Associated with the Proposed Modifications’ Dilution of the Value of Credits	22
III. CARB Should Continue to Review the Proposed Amendments	24

TABLE OF CONTENTS (Cont.)

	<u>Page</u>
A. CARB Staff Should Undertake a Peer Review to Evaluate the “Scientific Portions” of the Proposed Modifications (Health & Saf. Code, § 57004(b))	24
B. CARB Should Address the Issues Previously Raised by Growth Energy	25
IV. CONCLUSION.....	28

**Comments of Growth Energy on the Proposed Amendments to the
June 20, 2018, Notice of Public Availability of Modified Text and
Availability of Additional Documents and Information for the
Low Carbon Fuel Standard Regulation and to the
Regulation on Commercialization of Alternative Diesel Fuels**

Growth Energy respectfully submits these comments on the June 20, 2018, Notice of Public Availability of Modified Text and Availability of Additional Documents and Information (the “15-Day Notice”) for the rulemaking on the proposed amendments to the low carbon fuel standard (“LCFS”) regulation and the regulation on commercialization of alternative diesel fuels (“ADF”). Collectively, the proposed amendments to the LCFS and ADF regulations are referred to in these comments as the “Proposed Amendments,” while the proposed modifications to the LCFS and the ADF regulations identified in the 15-Day Notice are referred to as the “Proposed Modifications.” These comments are also accompanied by expert reports submitted by (i) Thomas Darlington of Air Improvement Resource Inc. and Donald O’Connor of (S&T)² Consultants Inc.; (ii) Jim Lyons of Trinity Consultants; and (iii) H-D Systems, which are enclosed as Exhibits “A” through “C.”

Growth Energy has several concerns regarding the Proposed Modifications, and believes several changes could be made to enhance the regulation. For example, to ensure the Proposed Amendments are based on “the best available economic and scientific information” available to CARB, (Health & Saf. Code, § 38562, subd. (e)), Growth Energy recommends that CARB modify its calculation of the direct and indirect emissions of corn and cane ethanol, and use updated versions of CA GREET and GTAP. Similarly, CARB should revise the EERs for various electricity pathways to ensure they are supported by the evidence.

Growth Energy is also concerned that the Proposed Modifications seek to treat hydrogen and electricity differently than other lower CI alternative fuels, and strongly suggests that CARB take a different approach that would achieve real and quantifiable greenhouse gas emissions. As such, Part II, Section A of these comments explains that, to the extent CARB issues credits for electricity and hydrogen capacity, CARB should also provide credits for capacity generated for other lower CI alternative fuels.

Part II, Section B of these comments explains why the Proposed Amendments and Proposed Modifications should receive additional input from the public. Specifically, since 2009, the LCFS has been based on a system under which regulated parties would receive credits based on carbon intensity (“CI”) and actual reductions in greenhouse gas emissions. The Proposed Modifications depart from the longstanding function and intent of the LCFS regulation, and propose to provide credits for the development of hydrogen and electricity charging infrastructure and unused capacity; in other words, credits would no longer be tethered to direct reductions in emissions. CARB staff itself has acknowledged these modifications are “certainly a philosophical departure from what the program has been about in the past” (Exhibit “D.”) In light of this significant change in both philosophy and function, a 15-day review process is insufficient under the Government Code. The Proposed Modifications are not “sufficiently related” to the original text, and therefore a 45-day review period is required under the California Administrative Procedure Act, Govt. Code, § 11350, *et seq.* (the “APA”). In addition, to comply with the California Environmental Quality Act, Pub. Resources Code, § 21000, *et seq.* (“CEQA”), the Environmental Assessment (“EA”) should be revised and recirculated based both on the significant change in the nature of the “project,” and the potentially significant environmental effects resulting from the implementation of the Proposed Modifications.

Part II, Section C urges CARB not to consider the Proposed Modifications on the basis that they would not “achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions from those sources or categories of sources, in furtherance of achieving the statewide greenhouse gas emissions limit,” as required under AB 32. (Health & Saf. Code, § 38560.5, subd. (c).)

Part II, Section D explains that, unlike the Proposed Modifications, Growth Energy’s E15 Alternative would result in actual reductions of greenhouse gas emissions; thus, CARB should fully evaluate the incorporation of E15 into the LCFS as an alternative. Part III, Section E, in turn, explains that the Standardized Regulatory Impact Assessment (“SRIA”) prepared under Section 11346.3 of the Government Code should be revised to address the dilution of credits and credit values caused by the issuance of credits for unused capacity at hydrogen and DC fast charging stations.

Part III, Section A of these comments explains that, pursuant to Section 57004(b) of the Health and Safety Code, CARB should undertake a peer review to evaluate the “scientific portions” of the Proposed Modifications. Part III, Section B explains that CARB should revise the LCFS and ADF to address comments previously raised by Growth Energy.

I. The CI Values for Corn Ethanol, Cane Ethanol, and Electricity should be Based on the Best Available Economic and Scientific Information

AB 32 requires that, in adopting amendments to the LCFS regulation, CARB establish “the maximum technologically feasible and cost-effective” method of reducing greenhouse gas emissions. (Health & Saf. Code, § 38561, subd. (a).) CARB must also use “the best available economic and scientific information” (Health & Saf. Code, § 38562, subd. (e).)

As an initial matter, Growth Energy asks that CARB define what it contends the term “best available scientific information” means. This is important so that a reviewing court can

assess whether CARB is reasonably construing the term for purposes of its development of the Proposed Amendments. This is of particular concern here because CARB appears to be relying on little scientific information in its efforts to provide credits for unused infrastructure, while at the same time declining to give adequate consideration to new data and findings concerning the direct emissions of various fuels and indirect land use change impacts.

Under any interpretation, the Proposed Amendments do not meet the standards set forth in Sections 38561(a) and 38562(e), as they continue to include inaccurate CI values for corn ethanol, cane ethanol, and electricity. (See Exhibit “A.”) If a CI sends the wrong “signal” to downstream regulated parties, then the LCFS regulation will result in the use of pathways that may increase GHG emissions above the levels that would result if the best possible CI values had been assigned to various renewable-fuel pathways in the regulation. (See Exhibit “A.”) While a small number of these issues were resolved through the Proposed Modifications, a review of the 15-Day Notice has revealed additional concerns with respect to the CI values proposed by CARB staff, which likewise would send the wrong “signals” and result in the greater use of higher CI fuels.

A. Calculation of Direct Emissions from Corn Ethanol & Sugarcane Ethanol [CA-GREET 3.0]

Growth Energy has reviewed CARB’s calculation of direct emissions for corn ethanol, which continue to be overstated. First, for its rail energy use, CARB has added the same amount of energy as backhaul energy for rail movement. This overstates rail emissions because the energy use for rail already includes backhaul energy. (See Exhibit “A” at 2.) Rail emissions are also overstated because they erroneously include the same energy use for both loaded and empty cars. (*Id.*)

Road emissions for corn ethanol are likewise overstated. The new version of CA GREET has changed the load size and fuel economy of vehicles in a manner unsupported by the evidence. For example, the energy use contemplated for certain heavy duty unloaded vehicles is 79.3% of the loaded vehicles, while U.S. DOE studies show the same loaded vehicles are three times the weight of unloaded vehicles (meaning that the energy use of unloaded vehicles should be closer to approximate 33% of a loaded vehicle). (See Exhibit “A” at 2.) U.S. DOE data likewise shows that backhaul (unloaded) energy use for medium duty vehicles is approximately 50-66% of loaded energy (compared to 79.3%). (*Id.*)

Moreover, despite the extensive comments previously provided for cane ethanol, which demonstrated the CI for cane was understated by approximately 5.5 g/MJ, the Proposed Modifications contain no revisions to correct this erroneous CI value. (*Cf.* April 27, 2018, Comments at 12-15.)

B. Calculation of Indirect Land Use Emissions to Reflect Current GTAP

Growth Energy also notes the Proposed Modifications do not include many of the revisions requested in its April 27, 2018, comments relating to indirect land use emissions. Such revisions are particularly important with respect to CARB’s continued use of an outdated GTAP model. Specifically, researchers at Purdue University updated the GTAP model in 2017, and those updates were reported in the peer review literature in July 2017. That model has been available to the public and CARB for an entire year, and includes many updates that correct known errors and inaccuracies in the prior model. (See Exhibit “A” at 1.) By failing to update its indirect land use change values to reflect the current version of the GTAP, the Proposed Amendments are not based on the “best available scientific information,” (Health & Saf. Code, § 38562, subd. (e)), and also fail to achieve the “maximum technologically feasible and cost-

effective reductions in greenhouse gas emissions.” (See Health & Saf. Code, § 38560.5, subd. (c).)

C. Treatment of Electricity under the LCFS Regulation

The LCFS uses an “Energy Economy Ratio” (“EER”) to account for differences in energy efficiency among different types of fuels and vehicles, which is “defined as the ratio of the number of miles driven per unit energy consumed for a fuel of interest to the miles driven per unit energy for a reference fuel.” (2009 ISOR at ES-18.) Following a review of the new information regarding the EERs in the 15-Day Notice, and the Proposed Modifications, Growth Energy has determined that several additional issues should be corrected:

- The 15-Day Notice states the estimated average efficiency for cargo handling equipment is 38%, but this is unrealistic and unsupported by the record. Indeed, the maximum efficiency (the highest possible percentage) for diesel engines is 41-42%. (See Exhibit “C” at 2.)
- The hours of operation by equipment type for cargo handling vehicles is unclear. Table 1 of Appendix D lists the hours of operation by vehicle type, and includes “hours” ranging from 1,900 to 401,633. The Table does not state annual use rate, and it is unclear what these values refer to. (See *id.*)
- The EER for Ocean Going Vessels (“OGV”) presumes all California ports will rely upon the local utility, without accounting for the fact that some ports generate their own electricity. (See *id.*)
- The EER for OGVs at berth does not account for the generation of electricity from boilers. (See *id.*)
- The EER of 2.6 for OGVs is not supported by substantial evidence in the record, as this figure does not appear to be based on any computation of electrical power generated by OGVs. (See *id.* at 3.)

To ensure the CI values assigned to electricity are based on the “best available economic and scientific information,” and reliable data and methodologies, CARB should correct these issues before adopting the Proposed Amendments.

II. Treatment of Infrastructure Capacity Credits

A. If CARB Issues Credits for Electricity and Hydrogen Capacity, it should also Issue Credits for Biofuel Infrastructure

As explained below, CARB should not consider the Proposed Modifications, as AB 32 and SB 32 do not authorize credits for underutilized capacity that is not tied to actual greenhouse gas emissions reductions. (See *infra* at § II.C.) In the event CARB does consider the Proposed Modifications, however, CARB should include infrastructure capacity credits for *all* low CI alternative fuels.

CARB has no rational basis to treat electricity and hydrogen in a manner different from other alternative fuels. While electricity and hydrogen have relatively low CI values, and CARB has stated a need to increase infrastructure associated with the delivery of those fuels to end-users, the same can be said for a wide-range of other fuels. Indeed, numerous alternative fuels have a similar or lower CI value than electricity and hydrogen (even when EERs are included), while the use of those fuels is likewise limited by infrastructure. There is no lawful basis articulated in the record for this differential treatment of alternative fuels across the LCFS regulation, much less a rational basis.

As such, to the extent CARB considers providing credits for generating capacity for electricity and hydrogen, it should do the same for all low-CI alternative fuels.

B. The Proposed Amendments and the EA Should Receive Additional Public Comment

1. The Proposed Modifications Are Not Sufficiently Related to the Original Text of the Proposed Amendments

California law provides that “[n]o state agency may adopt, amend or repeal a regulation which has been changed from that which was originally made available to the public . . . unless the change is . . . *sufficiently related* to the original text that the public was adequately placed on

notice that the change could result from the originally proposed regulatory action.” (Govt. Code, § 11346.8(c) [emphasis added].) To be “sufficiently related,” changes must be such that “a reasonable member of the directly affected public could have determined from the [original text of the] notice that these changes to the regulation could have resulted.” (1 C.C.R., § 42.)

Growth Energy is concerned the Proposed Modifications do not satisfy this standard, as it appears that “a reasonable member of the directly affected public could [*not*] have determined from the [original text of the] notice that these changes to the regulation could have resulted.” (1 C.C.R., § 42.) Until the Proposed Modifications were released, the LCFS previously focused exclusively on provisions that seek to achieve *actual* greenhouse gas emissions reductions. The proposed Zero Fueling Infrastructure Crediting Provisions, however, abandon this approach, and seek instead to award credits for capacity, regardless of whether actual greenhouse gas reductions are achieved. As a result, CARB staff has acknowledged these modifications are “certainly a philosophical departure from what the program has been about in the past” (Exhibit “D”; see also June 11, 2018 CARB Workshop [statements by CARB Staff] [recognizing the Proposed Modifications reflect a “departure from fuel neutrality,” and “go above and beyond what [CARB has] issued credits for in the past”].) Other commenting parties have observed that these changes represent a “paradigm shift” and a “clear departure from the concept that a ton [of emissions] is a ton [of emissions].” (June 11, 2018 CARB Workshop [statements by commenters in attendance].)

No “reasonable member of the directly affected public” could have anticipated the Proposed Modifications following a review of the original text of the March 6, 2018 Notice of Proposed Amendments to the LCFS (“Notice”). (1 C.C.R., § 42.) The Notice states:

Staff believes that the lack of fuel pathways that combine zero carbon electricity and ZEV fueling technology is due to the small geographic

footprint of ZEV infrastructure—which is often located in dense urban areas—making it difficult to co-locate renewable power generations with fueling stations. To address this issue, staff proposes to allow renewable power generated in the same balancing authority as the ZEV load to be used in EV charging and H2 production Additionally, staff is proposing an option to recognize and reward the GHG benefits of shifting EV charging and electrolytic hydrogen load to the periods of time when intermittent renewable electricity might otherwise be wasted (curtailed) These amendments are intended to promote the expansion of zero-emission vehicle infrastructure through the Low Carbon Fuel Standard Program as directed by Executive Order B-48-18.

(March 6, 2018 Notice of Proposed Amendments at 6-7.)

There is nothing in the original Notice that could reasonably apprise the interested public that CARB would be departing from a paradigm under which the LCFS provides credits for actual GHG emissions reductions. (1 C.C.R., § 42.) The Notice suggested that CARB would be promoting infrastructure by (i) “allow[ing] renewable power generated in the same balancing authority as the ZEV load to be used in EV charging and H2 production,” and (ii) recognizing and rewarding regulated parties that shifted “EV charging and electrolytic hydrogen load to the periods of time when intermittent renewable electricity might otherwise be wasted (curtailed)” (*Id.*) Plainly, both of these measures were based on providing credits for *actual usage*.

Now, in contrast, CARB seeks to untether credits from actual emissions reductions, and instead award credits for unused capacity. This is not only fundamentally different than the measures identified in the original Notice to promote infrastructure, but represents a wholesale change in the way the LCFS has been structured since its original promulgation in 2009. As CARB staff acknowledged at the workshop regarding the Proposed Modifications, the changes represent a “departure from the framework and philosophy of the program historically.” (June 11, 2018 CARB Workshop [statements by CARB staff].) Because the Proposed Modifications represent a paradigmatic change in the LCFS, and there was no mention in the original Notice of

the issuance of credits for unused infrastructure capacity, “a reasonable member of the directly affected public could [*not*] have determined from the [original text of the] notice that these changes to the regulation could have resulted.” (1 C.C.R., § 42.) As such, the Proposed Modifications are not “sufficiently related to the original text,” (Govt. Code, § 11346.8(c)), and the Proposed Modifications should be circulated for a full 45-day review period.¹

This is consistent with related federal case law interpreting parallel provisions in the federal Administrative Procedure Act. (See California Practice Guide, Administrative Law: Rulemaking and Open Government, at 23-58.) For example, in *Chocolate Manufacturers Association of United States v. Block* (4th Cir. 1985) 755 F.2d 1098, the Fourth Circuit held that the Department of Agriculture’s proposed rulemaking did not provide adequate notice that elimination of flavored milk from the Special Supplemental Food Program for Women, Infants and Children (“WIC Program”) would be considered in the rulemaking procedure.

As the Fourth Circuit explained, “[t]he requirement of notice and a fair opportunity to be heard is basic to administrative law.” (*Id.* at 1102.) “The notice-and-comment procedure encourages public participation in the administrative process and educates the agency, thereby helping to ensure informed agency decisionmaking.” (*Id.* at 1103 [quoting *National Tour Brokers Ass’n v. United States* (D.C. Cir. 1978) 591 F.2d 896, 902] [internal citations omitted].) Thus, “[a]lthough an agency, in its notice of proposed rulemaking, need not identify precisely every potential regulatory change, the notice must be sufficiently descriptive to provide interested parties with a fair opportunity to comment and to participate in the rulemaking.” (*Id.*

¹ Such a dramatic shift in the operation of the LCFS regulation deserves robust public input. Despite this, CARB published the 15-day notice on June 20, 2018, ensured the deadline for comments on the Proposed Amendments would fall on July 5, 2018, immediately after the July 4th holiday, and inclusive of two weekends. Consequently, the regulated public’s ability to contribute to the rulemaking process on this issue was severely truncated.

at 1104 [internal citations omitted].) Accordingly, notice is adequate if the changes “are *in character with the original scheme*” and the final rule is a “*logical outgrowth*” of the notice. (*Id.* [emphasis added].)

In finding the notice was inadequate, the Fourth Circuit emphasized that, “for many years the Department of Agriculture has permitted the use of chocolate in some form in the food distribution programs that it administers,” and that in all of the proposed rulemaking documents “the Department never suggested that flavored milk [might] be removed from the WIC Program.” (*Id.* at 1106.) Based on these facts, the Fourth Circuit concluded that “it cannot be said that the ultimate changes in the proposed rule were in character with the original scheme or a logical outgrowth of the notice.” (*Id.* at 1107.)

Here, as in *Chocolate Manufacturers*, the final rule included a provision that has reversed a long-standing policy of the agency concerning its regulatory program. As with the Department of Agriculture’s policy of permitting the use of chocolate in its food distribution programs, CARB’s long-standing policy of offering credits only for actual GHG emissions reductions meant that the public could not anticipate a contrary course of action absent specific notice of the agency’s intent. Yet here, as in *Chocolate Manufacturers*, CARB “never suggested” in its rulemaking notice that the agency might propose offering credits for infrastructure capacity. Consequently, CARB’s inclusion of regulations providing capacity credits for ZEV infrastructure is neither “in character with the original [LCFS] scheme” nor a “logical outgrowth” of the rulemaking notice. (*Id.* at 1104.) And, to make matters worse, CARB issued the 15-day notice on June 20, 2018, ensuring the comment deadline was the day after the Fourth of July holiday (and, in addition, would include two weekends), severely limiting the ability of the public to review and comment on the proposed change.

CARB's decision to proceed with a 15-day notice for the Proposed Modifications is not only unfair to the regulated public, but also detrimental to the efficiency and integrity of the rulemaking process. To ensure interested parties are provided sufficient time to understand the implications, both intended and unintended, of CARB's proposal, and to provide thoughtful and intelligent comments on the proposal, CARB should instead issue a second 45-day notice that specifically puts the public on notice of the agency's intent to offer credits for infrastructure capacity.

2. The Proposed Modifications Constitute “Significant New Information” and Render the Project Description Unstable

a. The Proposed Modifications Constitute “Significant New Information” under Section 15088.5 of the CEQA Guidelines

California law requires a lead agency to recirculate an environmental document when “significant new information” is added after the original public comment period, “but before certification.” (CEQA Guidelines, § 15088.5(a); see also Pub. Resources Code, § 21092.1.)

When a lead agency adds “significant new information,” the agency must pursue an additional round of consultation. (*Laurel Heights Improvement Assn. v. Regents of University of California* (1993) 6 Cal.4th 1112, 1130 [*“Laurel Heights I”*].) The purpose of requiring recirculation is to encourage meaningful public comment. (*Mountain Lion Coalition v. Fish & Game Commission* (1989) 214 Cal.App.3d 1043, 1053.) As the Supreme Court explained, “new information that demonstrates that an EIR commented upon by the public was so fundamentally and basically inadequate or conclusory in nature that public comment was in effect meaningless triggers recirculation.” (*Laurel Heights II*, *supra*, 6 Cal.4th at 1130.)

“‘To facilitate CEQA’s informational role, the EIR must contain facts and analysis, not just the agency’s bare conclusions or opinions.’ [Citations.] An EIR must include detail

sufficient to enable those who did not participate in its preparation to understand and to consider meaningfully the issues raised by the proposed project.” (*Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 404-405 [“*Laurel Heights I*”].) If an agency adds significant new information, the agency must recirculate a revised EIR, “so that the public is not denied an opportunity to test, assess, and evaluate the data and make an informed judgment as to the validity of the conclusions to be drawn therefrom.” (*Save Our Peninsula Committee v. Monterey County Bd. of Supervisors* (2001) 87 Cal.App.4th 99, 131.)

While new information is not “significant” when it “merely clarifies or amplifies or makes insignificant modifications in an adequate” environmental document, CEQA requires recirculation when the environmental analysis will be “changed in a way that deprives the public of a meaningful opportunity to comment upon a substantial adverse environmental effect of the project or a feasible way to mitigate or avoid such an effect” (CEQA Guidelines, § 15088.5(a).) Section 15088.5 enumerates several examples of what constitutes “significant new information,” but that list is not intended to be exhaustive. For instance, Section 15088.5 requires recirculation where (i) the new information discloses a new environmental effect or a substantial increase in the severity of a previously-recognized environmental effect, (see *id.*, subds. (a)(1), (a)(2)); (ii) mitigation measures or alternatives “considerably different” from those previously analyzed would lessen a project’s environmental effects, but the proponent declines to adopt such measures/alternatives, (see *id.*, subd. (a)(3)); and (iii) the environmental document is “so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded.” (*Id.*, subd. (a)(4).)

In this case, the 15-Day Notice reveals that CARB is seeking to change fundamental aspects of the “project” under CEQA. Specifically, since 2009, the LCFS been focused on

providing credits for actual greenhouse gas emissions reductions. The proposed Zero Fueling Infrastructure Crediting Provisions, however, would provide credits for mere capacity rather than actual use. Providing credits for unused capacity will not achieve the same greenhouse gas or criteria pollutant emissions benefits as the existing LCFS.

This change in the LCFS warrants recirculation for several reasons. First, with respect to the discussion of a project that includes credits for capacity for electric and hydrogen infrastructure, the environmental analysis is currently silent; there is simply no discussion in the environmental document about this new and fundamentally changed aspect of the project. As such, Growth Energy is concerned that CARB's discussion of the issuance of credits for capacity for electric and hydrogen infrastructure may be "so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded." (CEQA Guidelines, § 15088.5, subd. (a)(4).)

Moreover, CARB's new proposal has the potential to result in new environmental effects or a substantial increase in the severity of a previously-recognized environmental effect. (See CEQA Guidelines, § 15088.5, subds. (a)(1), (a)(2).) First, the entire purpose of the Proposed Modifications is to increase the number of hydrogen and DC fast charging stations that are constructed in California. CARB has previously admitted in its existing EA for the Proposed Amendments that the potential environmental effects associated with the construction of *other* facilities – *i.e.*, new or modified facilities to *produce* alternative fuels – constitutes a significant and unavoidable environmental effect. (See EA at 101-02.) Although it is not the public's burden to demonstrate a project would have potential environmental effects, (*Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 311 ["CEQA places the burden of environmental investigation on government rather than the public," and a lead agency "should

not be allowed to hide behind its own failure to gather data.”]), the evidence shows new hydrogen and DC fast charging stations could lead to potentially significant environmental effects (including, inter alia, aesthetics, air quality, biological resources, cultural resources, geology and soil, hydrologic resources, noise, and traffic and transportation). (See Exhibit “C” at 2.) Indeed, the Draft EA expressly notes that the construction of hydrogen and DC fast charging stations – which were not directly incented under the original proposal – would have potentially significant impacts:

Generally, it is expected that during the construction phase for any facilities, criteria air pollutants and toxic air contaminants (TACs) could be generated from a variety of activities and emission sources. These emissions would be temporary and occur intermittently depending on the intensity of construction on a given day. Site grading and excavation activities would generate fugitive particulate matter (PM) dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (e.g., respirable particulate matter [PM10] and fine particulate matter [PM2.5]) vary as a function of several parameters, such as soil silt content and moisture, wind speed, acreage of disturbance area, and the intensity of activity performed with construction equipment. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. Exhaust emissions from construction-related mobile sources could also result in short-term increases in CO, CO₂, hydrocarbons, PM, reactive organic gases (ROG), and nitrogen oxides (NO_x). These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment.

(EA at 128.) In other words, the Proposed Modifications would result in new or increased significant effects that CARB has previously conceded would occur. (See CEQA Guidelines, § 15088.5, subds. (a)(1), (a)(2).)

In addition, as explained in Growth Energy’s April 27, 2018, comments on the Proposed Amendments, it is critically important that CARB use scientifically defensible CI values that will result in actual emissions reductions, based on the “signals” to downstream regulated parties. If CARB sends the wrong signals, and incentivizes the use of higher CI fuels, greenhouse gas

emissions would be higher. Here, by providing credits for infrastructure and capacity, CARB is lessening the value of credits for other lower CI fuels, and increasing the value of credits for electrical generation and hydrogen. By sending these inaccurate signals, and untethering credits from actual emissions reductions, any greenhouse gas benefits associated with the LCFS will be substantially less than contemplated in the EA. Likewise, the Proposed Modifications have the potential to displace lower CI fuels with alternative fuels with higher CI values, and bring into question whether CARB can meet the emissions reductions contemplated under SB 32.

Growth Energy is unaware of any analysis CARB has performed with respect to how many tons per year of greenhouse gas emissions would be lost as a result of the generation of credits for electricity and hydrogen capacity. However, using CARB's own Illustrative Compliance Scenario, Growth Energy's experts have found that capacity credits equal to 5% of deficits could result in "potential lost benefits for calendar year 2020 alone to amount to approximately 820,000 metric tons" of greenhouse gas emissions. (Exhibit "B" at 1.)

Further, the Proposed Modifications amend the sunset date for NO_x mitigation in a manner that could have potentially significant environmental effects. In the EA, CARB analyzed the Proposed Amendments, which originally contemplated an extension of the sunset date for NO_x mitigation until such time that at least 90% of the hours of operation of diesel fueled engines were accumulated by so-called "New Technology Diesel Engines" (NTDEs). (EA at 24; ISOR at EX-7, -13.) The Proposed Modifications change the phase-out provisions significantly, contemplating separate sunset dates for the biodiesel NO_x mitigation requirements for on-road and non-road diesel vehicles and engines. (15-Day Notice at 23.) Yet the EA was not modified to address this issue.

The EA should be augmented. First, as explained in prior comments, CARB's assumption that there is no increase in NOx emissions from NTDEs is not supported by substantial evidence. Thus, shortening the end of the mitigation period for on-road diesel vehicles would increase NOx emissions. (See Exhibit "C" at 5.) In addition, there is nothing in either the Proposed Amendments or the Proposed Modifications that, following the sunset date for one category of vehicles, would prohibit biodiesel without mitigation to be introduced into the other category of vehicles or engines that have not yet reached the sunset date. (*Id.* at 5.) This introduction of non-mitigated biodiesel into non-NTDE engines would increase NOx emissions. This is of even greater concern because "the reporting requirements of the ADF regulation do not make any distinction between bio-diesel blends intended for use as on-highway or non-road fuels and there is no explicit prohibition or enforcement mechanism in the ADF regulation against introducing non-mitigated on-highway diesel fuel into any non-road engine." (*Id.*) Thus, by disaggregating the sunset dates, the Proposed Modifications would have potentially significant environmental effects as to NOx emissions.

In short, because the EA does not address the fundamental shift in the regulatory approach taken with respect to the generation of credits embodied by the Proposed Modifications, and because the construction of new and modified infrastructure for electric and hydrogen fuel stations has the potential to result in new environmental effects or a substantial increase in the severity of a previously-recognized environmental effects, the EA should be revised to include the Proposed Modifications as part of the "project," and recirculated for public review.² (See CEQA Guidelines, § 15088.5, subds. (a)(1), (a)(2).)

² The environmental document should also be recirculated because members of the public, including Growth Energy, proposed numerous alternatives and mitigation measures "considerably different" from those previously analyzed that would lessen the significant

b. The Project Description is Unstable Because the EA Evaluates a Different Project than what is now Being Proposed

A lead agency's environmental document under CEQA must include a clear and comprehensive description of the proposed project; this is critical for the agency to perform an accurate analysis of impacts and meaningful public review. (*County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 193 (“*Inyo II*”). As explained in *Inyo II*:

A curtailed or distorted project description may stultify the objections of the reporting process. Only through an accurate view of the project may affected outsiders and public decision-makers balance the proposal's benefit against its environmental cost, consider mitigation measures, assess the advantage of terminating the proposal (*i.e.*, the “no project” alternative) and weigh other alternatives in the balance.

(*Id.* at 192-93.) “A curtailed, enigmatic or unstable project description draws a red herring across the path of public input.” (*Id.* at 197-98; see also *San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th at 655-57 [invalidating an EIR for misleading project description].)

Although CARB has introduced Proposed Modifications that represent a significant “departure from the framework and philosophy of the program historically,” (June 11, 2018 ARB Workshop [statements by CARB Staff]; see also Exhibit “D”), CARB did not modify the EA or otherwise discuss the potential environmental effects of the Proposed Modifications. Thus, in its current state, the EA addresses a different “project” under CEQA than what is being proposed and considered by CARB. As such, the project description is neither complete nor accurate. To ensure compliance with CEQA, CARB should modify its environmental analysis to

environmental effects of the Proposed Amendments; however, CARB has declined to adopt those mitigation measures and project alternatives. (CEQA Guidelines, § 15088.5(a)(3).)

incorporate the “project” under consideration, and recirculate the EA for public review, prior to its consideration of the Proposed Modifications.

C. The Proposed Modifications are Inconsistent with CARB’s Defined Project Objectives, AB 32, and SB 32

The LCFS regulation is an “implementation measure” adopted under the color of AB 32 and SB 32. As such, the LCFS must “achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions from those sources or categories of sources, in furtherance of achieving the statewide greenhouse gas emissions limit.” (Health & Saf. Code, § 38560.5, subd. (c); see also *id.* § 38562, subd. (a) [including similar language].) SB 32 likewise references CARB’s mandate to adopt “rules and regulations to achieve the maximum technologically feasible and cost-effective greenhouse gas emissions reductions” (Health & Saf. Code, § 38566.)

The Proposed Modifications are inconsistent with these objectives. The Proposed Modifications would “effectively decrease the actual GHG reductions associated with the LCFS program by up to 5%.” (Exhibit “B” at 1.) Thus, assuming the LCFS actually reduces greenhouse gas emissions,³ it is unclear how the Proposed Modifications can be reconciled with the Legislature’s mandate that the LCFS “achieve the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions” (Health & Saf. Code, § 38560.5, subd. (c); see also *id.* § 38562, subd. (a) [including similar language].) To the extent the Proposed Modifications are not consistent with the Legislature’s mandate, their adoption constitutes an *ultra vires* act.

³ Growth Energy notes that, as explained previously, the phenomenon of fuel-shuffling reduces, if not eliminates, the greenhouse gas emissions benefits associated with the LCFS. (April 27, 2018, Comments of Growth Energy at 48-49.)

There is likewise no practical need for the LCFS to provide credits for unused infrastructure, as any such efforts would be largely duplicative of concurrent state efforts to subsidize hydrogen station construction and the deployment of DC fast charging stations. (See Exhibit “B” at 3-4.) In essence, the provision of credits for hydrogen and electric charging infrastructure would amount to little more than providing entities credits for infrastructure that is already being largely funded by the State. (*Cf.* Government Code § 11342.2 [“[N]o regulation adopted is valid or effective unless consistent and not in conflict with the statute and reasonably necessary to effectuate the purpose of the statute.”].)

Growth Energy understands CARB may claim the Proposed Modifications are required under Executive Order B-48-18. While Executive Order B-48-18 arguably directs CARB to “[r]ecommend ways to expand zero-emission vehicle infrastructure through the Low Carbon Fuel Standard Program,” the executive order does not require the generation of credits for infrastructure based on unused capacity as opposed to actual utilization. And even if Executive Order B-48-18 could be read as mandating the issuance of credits for capacity regardless of actual utilization, the executive order would be contrary to AB 32 and SB 32, as explained above.

The Proposed Modifications are also inconsistent with CARB’s articulated project objectives. While the EA states that the goal of the Proposed Amendments is to “strengthen the CI reduction targets through 2030” to comply with SB 32, and to “reduce the CI of transportation fuels in the California market,” the Proposed Amendments bear no direct relation to any reduction in CI; rather, they are based solely on capacity without respect to actual utilization. (*Cf.* EA at 15.) Moreover, while CARB has stated that one of its project objectives is to “provide greater innovation and development of cleaner fuels,” (*cf. id.*) – and has specifically rejected

alternatives on this basis in the past, (see Exhibit “B” at 3-4) – the Proposed Modifications seek to provide uneven benefits to certain existing technologies, while at the same time ignoring infrastructure needs for other low-CI alternative fuels. Thus, the Proposed Modifications appear to undermine CARB’s own stated objectives.⁴

Because the Proposed Modifications are inconsistent with AB 32 and SB 32, as well as the project objectives, CARB should decline to consider the Proposed Modifications.⁵

D. CARB Should Adopt the E15 Alternative Instead of the Proposed Modifications

In its April 27, 2018, comments, Growth Energy proposed an “E15 Alternative,” under which CARB would concurrently adopt fuel specifications for E15, and incorporate E15 into the LCFS. Because E15 is a low CI fuel and is actively being used in at least 28 states, using a greater percentage of ethanol would help reduce greenhouse gas emissions “to at least 40 percent below the statewide greenhouse gas emissions limit no later than December 31, 2030,” in a manner that is both technologically feasible and cost-effective. (Health & Saf. Code, § 38566; see generally April 27, 2018, Comments of Growth Energy at 23-24, 57-58.)

As explained in the expert materials submitted herewith, “it is easy to assess the potential GHG reduction benefits from allowing E15 to be sold in California.” (Exhibit “B” at 3.) For example, using “CARB’s LD/High ZEV/20% scenario for calendar year 2020, and assuming that

⁴ CARB has previously declined to consider alternatives to the LCFS regulation because they do not meet CARB’s project objective of “provid[ing] greater innovation and development of cleaner fuels.” (Cf. EA at 15.) Based on the fact that the Proposed Modifications would undermine this project objective, CARB should (i) remove fostering innovation as a project objective, and/or (ii) fully consider each of the project alternatives that CARB has previously rejected on the basis that those alternatives would allegedly not foster innovation to the same as the LCFS regulation.

⁵ Notably, the 15-Day Notice makes no reference to the project objectives articulated in the ISOR or the EA; much less any analysis of whether the Proposed Modifications meet the project objectives.

the credits generated only by starch ethanol increase by 50% (given that the volume of ethanol used will increase by 50% going from E10 to E15), the resulting reduction in GHG emissions would equal 1,126,000 metric tons of GHG emissions from increased use of ethanol plus a further reduction of another 760,000 metric tons of GHG emissions due to reduced use of petroleum based gasoline blendstocks.”⁶ (See Exhibit “B” at 3-4.) The Proposed Modifications, in contrast, would *increase* greenhouse gas emissions compared to the original Proposed Amendments. Thus, in addition to being a “more effective and less burdensome” alternative that (i) meets the legislative objective of reducing greenhouse gases, (see Govt. Code, § 11346.9, subd. (a)(4)), and (ii) avoids the LCFS’s potentially significant environmental effects, (see generally Pub. Resources Code, § 21001), the adoption of the E15 alternative would further – and not undermine – CARB’s statutory mandate.

As a result of the foregoing, CARB should incorporate the E15 Alternative as a project alternative under CEQA, and approve the E15 alternative instead of the Proposed Amendments. (See Govt. Code, § 11346.9, subd. (a)(4); Pub. Resources Code, § 21001; CEQA Guidelines, §§ 15043.)

E. The SRIA Should Be Augmented to Address Impacts Associated with The Proposed Modifications’ Dilution of the Value of Credits

The APA requires that state agencies proposing to “adopt, amend, or repeal any administrative regulation” must perform an assessment of “the potential for adverse economic impact on California business enterprises and individuals.” (Govt. Code, § 11346.3, subd. (a).) The APA requires, *inter alia*, that CARB prepare a SRIA analyzing “the potential adverse

⁶ In addition to reducing the greenhouse gas emissions benefits associated with the Proposed Amendments, the Proposed Modifications would also reduce the alleged criteria pollutant emissions benefits of the ADF regulation – including NO_x emissions. (See Exhibit “B” at 4.) The EA, however, does not address this issue.

economic impact on California business and individuals of a proposed regulation,” (Govt. Code, § 11346.3), and declare in the notice of proposed action any initial determination that the action will not have a significant statewide adverse economic impact directly affecting business. (Govt. Code, § 11346.5, subd. (a)(8); *WSPA v. Board of Equalization* (2013) 57 Cal.4th 401, 428.)

The SRIA should be revised to include impacts associated with the Proposed Modifications. Specifically, the economic impact of providing credits for unused fuel capacity at hydrogen and DC fast charge stations must be considered. As noted by Growth Energy’s experts, using a very conservative (*e.g.*, low) assumed value of \$100 per LCFS credit, the value of LCFS credits awarded for unused capacity at hydrogen and DC fast charge could amount to as much as \$82 million in a single year (2020), and the cumulative value of all credits awarded over period allowed under the Proposed Amendments by CARB is likely to much greater. Further, by providing credits for unused infrastructure, the Proposed Amendments “will decrease the value of LCFS credits generated by other means that do in fact result in actual reductions in GHG emissions.” (Exhibit “B” at 2.) This is because “the ‘capacity’ credit provisions will artificially increase the supply of LCFS credits for which there is a finite demand which in turn will decrease the value of all LCFS credits” relative to what it would have otherwise been. (*Id.*) This devaluing of credits will impact credit holders, and decrease the alleged benefits identified in the Proposed Amendments.

To avoid these impacts, the Proposed Modifications should not be adopted. But if they are, CARB should first revise the SRIA and accurately assess the economic impacts of the Proposed Modifications.

III. CARB Should Continue to Review the Proposed Amendments

A. CARB Staff Should Undertake a Peer Review to Evaluate the “Scientific Portions” of the Proposed Modifications (Health & Saf. Code, § 57004(b))

Section 57004(d) of the Health and Safety Code states that CARB shall not “take any action to adopt the final version of a rule unless” it undertakes a peer review to evaluate the “scientific portions” of the rule. (Health & Saf. Code, § 57004(d).) However, none of the rulemaking materials submitted with the 15-Day Notice show that CARB retained a peer reviewer to evaluate the Proposed Modifications (or the Proposed Amendments).

Peer review of the Proposed Modifications is required, as the new text is premised upon, or derived from, empirical data or other scientific findings, conclusions, or assumptions establishing a regulatory level, standard, or other requirement for the protection of public health or the environment.” (*Id.*, subd. (a)(2).) These “scientific portions” include, but are not limited to:

- The extent to which new hydrogen and DC fast charging stations receiving credits under the LCFS would be utilized;
- Whether the issuance of credits for unused capacity would result in direct decreases in greenhouse gas emissions;
- Whether the issuance of credits for unused capacity would decrease the greenhouse gas and criteria pollutant emissions benefits of the LCFS;
- The extent to which the development of new hydrogen and DC fast charging stations would result in environmental effects;
- Whether NTDE engines, in fact, result in no increase in NOx emissions when operated on biodiesel;
- Whether disaggregating the sunset dates for mitigation of NOx increases from biodiesel used in non-road and on-road diesel engines would increase NOx emissions;
- CARB’s decision to provide credits for hydrogen and electric charging infrastructure, but not infrastructure for other low carbon fuels;

- The use of an updated GTAP to calculate indirect land use change;
- The energy use attributed to transport of corn ethanol by rail;
- The energy use attributed to transport of corn ethanol by road;
- The EER for cargo handling vehicles;
- The EER for ocean going vessels; and
- Whether the issuance of credits for capacity would dilute the value of shares for actual greenhouse gas emissions reductions.

B. CARB Should Address the Issues Previously Raised by Growth Energy

Growth Energy previously submitted comments on the Proposed Amendments on April 27, 2018. Growth Energy, however, has noted that very few of the issues raised in the April 27, 2018, comments have been corrected. While Growth Energy understands CARB must “summarize and respond to the comments” before “taking final action on” the proposal, (17 Cal. Code Regs., § 60007(a)), Growth Energy believes nearly all of the comments warranted corrections that should be incorporated into the final version of the Proposed Amendments. As a result, Growth Energy requests that CARB revise the Proposed Amendments and/or the EA to address the issues previously raised in the April 27, 2018, comment letter. These issues include:

- **CA-GREET 3.0**

- The most current version of the GREET model includes a distillers’ grains (DDG) methane avoidance credit, which equals 2.1 g/MJ, and is not incorporated into CA GREET 3.0 under the Proposed Modifications.
- Although the ISOR estimates that the CI for corn ethanol will drop from approximately 70 g/MJ to 45 g/MJ, it is unclear what evidence the Executive Officer relied upon to determine corn ethanol facilities would install CCS systems at a rate necessary to reduce their CI to 45 g/MJ. As a result, Growth Energy urges CARB to swiftly consider the approval of the proposed pathways for such fuel to help provide evidentiary support for CARB’s 45 g/MJ estimate.

- The CI for corn starch ethanol under CA GREET 3.0 contains a value for the electricity that is used in transportation and distribution with an emission factor developed using US average power, even though most such emissions are likely to be in California.
- The CI for sugarcane is understated because the nitrogen content of biomass and fertilizer for sugarcane are far higher than estimated by CARB.
- CA GREET 3.0 uses the same emission factor for truck transport in Brazil and California, even though Brazil should be higher.
- CA GREET 3.0 uses simplified calculators for corn ethanol and sugarcane ethanol that contain several errors. Unless corrected, the CI for sugarcane ethanol will be understated, and the CI for corn will be overstated.
- **Calculation of Indirect Land Use Emissions (“ILUC”)**
 - Using CARB’s AEZ-EF model in conjunction with GTAP to estimate emissions associated with the various land use changes, researchers have determined that the ILUC for corn starch ethanol should be reduced from 19.8 g/MJ to 10.3 g/MJ.
 - The current ILUC for corn starch ethanol is based on 2011 conditions, which correspond to a drought year in the U.S. that negatively impacted corn yields. When a three-year average is used, the ILUC should be reduced significantly.
- **Energy Economy Ratio (“EER”)**
 - The EER for electricity is far too high because the estimates were generated based on testing performed with accessory modes off.
 - The EER for electricity is also too high because it is based on optimal temperature (75°-80°) for battery efficiency, and not real world conditions.
 - The EERs for numerous vehicles are overstated.
- **Treatment of Renewable Electricity for Fuel Pathways**
 - The Proposed Amendments do not allow CI reduction for dedicated renewable electricity unless the generation facilities are co-located with the fuel production facility, removing incentives for fuel producers to develop renewable sources for process energy.
 - The proposed Zero Fueling Infrastructure Crediting Provisions provide credits for capacity rather than actual use. Providing credits for capacity will not achieve the same GHG or criteria pollutant benefits as the existing LCFS.

- **Analysis of Alternatives Under the Government Code**
 - CARB should consider the WSPA Alternative which contemplates that GHG emissions currently attributable to the LCFS program would “instead be achieved by the Assembly Bill (AB) 32 Cap and Trade Program in the most cost-effective manner to address GHG emissions.”
 - CARB should consider the E15 Alternative under which CARB would concurrently adopt fuel specifications for E15 and incorporate E15 into the LCFS.
- **Adequacy of Economic Analysis in the SRIA**
 - The current SRIA does not meet the applicable standards under the APA. The ISOR’s discussion of the “elimination of existing businesses” and “the competitive . . . disadvantages” does not fully address or take into account that the LCFS regulation is projected to increase the price of gasoline.
- **External Peer Review**
 - It is unclear whether CARB sought external peer review for:
 - The accuracy of each of the components of CA-GREET 3.0, and the effect on the CI for corn ethanol and sugarcane ethanol;
 - The ILUC for corn ethanol;
 - The EER for electricity;
 - The efficacy of NTDEs to reduce NOx emissions from biodiesel;
 - The accuracy of CARB’s compliance scenario, including but not limited to the adaptation of alternative jet fuels, solar steam projects, and renewable diesel; and
 - The potential impacts associated with CARB’s compliance scenarios, particular with respect to alternative jet fuels, solar steam projects, and renewable diesel.
- **Noncompliance with AB 32**
 - The LCFS regulation has resulted in increased and unmitigated NOx emissions from biodiesel since its inception. There is nothing in the Proposed Modifications that suggests these emissions would be mitigated through the payment of funds to local air districts for NOx mitigation projects.

- The proposed mitigation to continuing NO_x emissions is not consistent with CEQA. The ISOR's conclusions are based on assumptions concerning industry's use of renewable diesel and alternative jet fuel, and the development of solar steam projects, none of which are required to occur, and all of which are speculative.
- The LCFS will result in the construction of new or modified facilities for alternative fuels incentivized by the regulation.
- The LCFS regulation will continue to result in fuel shuffling, which increases emissions.
- **Requirements of Transparency**
 - CARB must maintain a full and complete rulemaking file:
 - The rulemaking file must include external communications submitted to the staff, the Executive Officer or the Board prior to the date when the rulemaking file is formally opened. If those communications are not included, it should be explained why.
 - Growth Energy urges CARB to take all necessary measures to ensure all external submittals (not within the scope of section 11347.3(b)(7)) concerning this regulatory process have been included in the rulemaking file.
 - Growth Energy also urges CARB to ensure all factual information relied upon by CARB staff in connection with the consideration of the Proposed Amendments is included in the rulemaking file.

IV. Conclusion

Thank you for the opportunity to participate in this rulemaking, and your anticipated consideration of the above comments. Growth Energy strongly believes corn ethanol can help CARB in meeting its greenhouse gas reduction targets; however, the regulations CARB considers should be objective in nature and not favor one industry or technology over another. In this regard, the Proposed Modifications exacerbate the existing shortcomings of the LCFS and ADF regulations. As such, CARB should fully address and consider meaningful alternatives to the LCFS regulation (including the WSPA Alternative and the E15 Alternative), and should decline to incorporate the Proposed Modifications into the Proposed Amendments. In the event

CARB considers the Proposed Modifications, CARB should expand capacity credits to all low carbon fuels.

Exhibit “A”

Comments on 15-Day Notice

July 5, 2018

By Thomas Darlington, Air Improvement Resource Inc.

Donald O'Connor, (S&T)² Consultants Inc.

The 15-day notice fails to address our 45-day comments on the need to update indirect land use emissions in these current LCFS amendments, and the significant impacts of doing so.

ARB uses the Purdue University GTAP model to evaluate indirect land use emissions. Our comments point out that the current GTAP model which addresses many issues with indirect land use emissions raised over the last few years was developed by Purdue, and reported in the peer reviewed literature in July 2017. The literature indicates that the indirect land use change emissions for corn would have dropped from ARB's current estimate of 19.8 g/MJ to around 10 g/MJ. This model has been available from Purdue for use by ARB since July 2017 (the model is available to the public), and using ARB's previous 30 sensitivity cases for the various input elasticities, it could have generated new indirect land use estimates for all biofuel feedstocks in a few weeks, certainly by September of 2017. The regulatory calendar for the LCFS regulation allowed ample time to use the new, correct GTAP values. Because the Proposed Amendments do not use indirect land use change values from the current GTAP model, the Proposed Amendments are not based on the best available scientific information.

Updates to the GREET Model for Corn and Sugarcane

Corn Ethanol

Effects of Distillers Grains on Enteric Fermentation

The modifications proposed in the 15-day notice do not include any revisions addressing our prior comments on distillers' grains reducing enteric fermentation. This is a factor that is included in the GREET2016 model, from which the CA GREET3.0 is derived. The GREET2016 model DG enteric fermentation credit for corn ethanol is estimated at 2,260 g CO₂e/mmBTU of ethanol (2.1 gCO₂e/MJ). As we pointed out in our prior comments dated April 23, 2018, ARB's main reason for not including this factor appears to be that the animals consuming the DGS rations are not currently in the LCFS LCA ethanol system boundary. However, we previously noted that ARB has made exceptions to boundary conditions for other pathways, and we further pointed out that ARB's position on this is also inconsistent with ISO lifecycle assessment standards. To be consistent with the best available scientific information, the LCFS should be updated to include this DG credit at this time.

Transport Emissions

Rail

For rail energy use, ARB has added the same amount of energy as backhaul energy for rail movement. This is not necessary as the energy use for rail is calculated by taking the total fuel used for class 1 railroads and dividing that by the ton-miles of freight moved by those railways. This calculation automatically includes the energy used for back hauls; thus, it is not necessary to double the value. However, even if the backhaul energy was not already included, it would not be the same value as the energy for a loaded car. There is really no justification given for adding the backhaul energy in Attachment C.

The ORNL Transportation Energy Data Book Edition 36 reports (Table 9.8) that the total freight moved in 2015 was 1.744 million ton-miles and the energy used by the railroads was 516.4 trillion BTU for a total energy use of 294 BTU/ton-mile which would include the movement of empty cars.¹ CA GREET 3.0 has 274 BTU/ton-mile for loaded and the same energy for unloaded movements. This is not correct and the back haul energy for rail should be removed from the model. The methodology is reported in section 6.2 of Appendix A.

Road

The road energy use in GREET is calculated by taking the vehicle fuel consumption and load and from that calculating the BTU/ton-mile. There is no equivalent data set as exists for the railways where the total fuel used and the total freight moved is available, so the approach in GREET is reasonable. In this version of CA GREET 3.0, however, CARB has changed the load size and the fuel economy without explanation. As a result of the changes, the energy use for a HD truck for corn has been reduced from 3231 BTU/ton-mile to 1574 BTU/ton-mile and the energy use for the back haul is 79.3% of the loaded energy use. This is not accurate. The US DOE reported that a loaded class 8 truck typically weighs three times the unloaded vehicle weight.² As a result, back haul energy use should be closer to the ratio of the weight of unloaded vehicle to the fully loaded vehicle that is 33%. There is no explanation for, or evidence to support, the new fuel economy values used by CARB.

While the energy use for the heavy-duty trucks decreased, the values for the medium duty trucks increased from 3088 BTU/ton-mile to 6231 BTU/ton-mile. The primary reason for this is that the load size was cut almost in half along with a reduction in the miles per gallon. No source for the data is provided and the back haul energy is the same 79.3% of the loaded energy, which is again too high a value. Specifically, the DOE reports that the medium-sized trucks (truck classes 3-6) have payload capacity shares between 50% and

¹ <https://info.ornl.gov/sites/publications/Files/Pub104063.pdf>

² <https://www.energy.gov/eere/vehicles/fact-621-may-3-2010-gross-vehicle-weight-vs-empty-vehicle-weight>.

100% of the unloaded weight, which suggests that the back haul energy use should be 50% to 66% of the loaded energy use.

Sugarcane Ethanol Emissions

We made a number of comments on the carbon intensity of the sugarcane pathway, which were not adopted in the 15-day notice. Implementation of these suggestions would have increased the CI of sugarcane ethanol by about 5.5 g/MJ. To ensure the Proposed Amendments are based on the best available scientific information, our suggested changes should be implemented.

Summary of 15-day Modifications for EV and HV

In the 15-day notice, ARB proposes to greatly expand the credits for EV and HEV vehicle refueling infrastructure. In the original proposal, credit is given for fuel used by these vehicles. But in the 15-day notice, ARB proposes to give credits to infrastructure built to refill EVs and HEVs based on refueling capacity, rather than fuel use. ARB proposes some limits on the size of these credits in any one-quarter of a year, and also the life of these credits. But such “capacity” credits achieve no GHG emission reductions, like the actual fuel use.

The proposal appears to be hurriedly developed, and there is not sufficient time available for the public to comment on the concerns that this raises. It is not clear why ARB did not propose this at an earlier date. Accordingly, additional time for public comment should be permitted.

To the extent ARB continues to propose capacity credits for HEVs and EVs, ARB should provide capacity credits for other low-CI alternative fuels, including E15. Notably, there are no capacity credits for E15 refueling facilities for flexible fuel vehicles (FFVs) under the proposed amendments, which could likewise increase the use of low GHG biofuels.

Curriculum Vitae
For
Thomas Darlington
And
Donald O'Connor

Thomas L. Darlington
President, Air Improvement Resource Inc.

Profile

Thomas L. Darlington is President of Air Improvement Resource, a company formed in 1994 specializing in mobile source emission modeling. He is an internationally recognized expert in mobile source emissions modeling, lifecycle analysis, and land use modeling.

Professional Experience

1994-Present	President, Air Improvement Resource
1993-1994	Director, Mobile Source Programs, Systems Application International
1989-1994	Senior Engineer, General Motors Corporation, Environmental Activities
1988-1989	Senior Project Engineer, Detroit Diesel Corporation
1979-1988	Project Manager, U.S. EPA, Ann Arbor, Michigan

Recent Major Projects

- Provided numerous OMEGA outputs to The Alliance for their review of the 2022-2025 GHG standards
- Participating on behalf of Growth Energy in EPA's MOVES model development stakeholder meetings
- Creating a new California emissions model for offroad equipment
- Published a Society of Automotive Engineers paper at SAE World Congress in 2017 (April 2017) on modeling GHG emission reductions with a high octane, low carbon biofuel (Minnesota Corn Growers and others)
- Published an SAE paper at the 2016 World Congress on our review of EPA's EPAAct fuels testing and modeling (Growth Energy)
- Developed Life Cycle reports and complete applications for 8 plants for the California Low Carbon Fuel Standard
- Participated in and provided written comments on California's three 2014 Indirect Land Use (iLUC) workshops (Growth Energy)
- With Purdue University, conducted study of iLUC emissions of rapeseed and other oilseeds in 2013 utilizing an updated version of GTAP (European Biodiesel Board)
- Reviewed EPA's palm oil iLUC emissions in 2013 (NESTE)
- Submitted comments on ARB's new GREET2.0 model
- Reviewed CARB's land use emissions for soybean biodiesel
- Reviewed the land use impacts of the RFS2 from EPA, including the notice of Proposed Rule, Regulatory Impact Analysis, and approximately one hundred documents in the rulemaking docket.

- Completed a land use study for Renewable Fuels Association and reviewed California Air Resource Board's Initial Statement of Reasons for the Low Carbon Fuel Standard
- Represented three stakeholders in the recent development of the ARB Predictive Model for reformulated gasoline in California (Alliance of Automobile Manufacturers, Renewable Fuels Association and Western States Petroleum Association)
- Represented two stakeholders in EPA's development of the MOVES on-highway emissions model (Alliance of Automobile Manufacturers and Engine Manufacturers Association)
- Developed the effects of ethanol permeation on on-highway and off-highway mobile sources in California and other states for the American Petroleum Institute
- Studied gasoline and diesel fuel options for Southeast Michigan (for SEMCOG, API and Alliance of Automobile Manufacturers)

Recent Publications

Darlington, T., Herwick, G., Kahlbaum, D., and Drake, D., "Modeling the Impact of Reducing Vehicle Greenhouse Gas Emissions with High Compression Engines and High Octane Low Carbon Fuels," SAE 2017-01-0906, 2017, doi: 10.4271/2017-01-0906.

Darlington, T., Kahlbaum, D., Van Hulzen, S., and Furey, R., "Analysis of EPA Act Emission Data Using T70 as an Additional Predictor of PM Emissions from Tier 2 Gasoline Vehicles", SAE Technical Paper 2016-01-0996, 2016, doi: 10.4271/2016-01-0996.

"Study of Transportation Fuel Life Cycle Analysis: Review of Economic Models Used to Assess Land Use Effects", CRC-E-88-3, July 2014.

"Land Use Change Greenhouse Gas Emissions of European Biofuel Policies Utilizing the Global Trade Analysis Project Model", Darlington, Kahlbaum, O'Connor, and Mueller, August 30, 2013.

"A Comparison of Corn Ethanol Lifecycle Analyses: California Low Carbon Fuels Standard (LCFS) Versus Renewable Fuels Standard (RFS2)", June 14, 2010. Renewable Fuels Association and Nebraska Corn Board. This study compared and contrasted the corn ethanol lifecycle analyses performed by both CARB (as a part of the LCFS) and the EPA (as a part of RFS2).

"Review of EPA's RFS2 Lifecycle Emissions Analysis for Corn Ethanol", September 25, 2009. Conducted for Renewable Fuels Association. This study reviewed EPA's land use GHG emissions assessment for corn ethanol, including the FASOM and FAPRI models and Winrock land-use types converted and emission factors by ecosystem type. The study made many recommendations for improving the land-use and emissions modeling.

“Review of CARB’s Low Carbon Fuel Standard Proposal”, April 15, 2009. Conducted for Renewable Fuels Association. This study reviewed CARB’s analysis of land use emissions using GTAP6 and CARB’s overall lifecycle emissions for corn ethanol. This study made many recommendations for improving the land use and lifecycle emissions of corn ethanol.

“Emission Benefits of a National Clean Gasoline”, August 2008. Conducted for the Alliance of Automobile Manufacturers. This study evaluated the nationwide criteria pollutant emission reductions of a national clean gasoline standard.

“Land Use Effects of Corn-Based Ethanol”, February 25, 2009. Conducted for Renewable Fuels Association. This study evaluates possible land use changes and GHG emissions associated with these land use changes as a result of the renewable fuel standard mandated 15 billion gallons of corn ethanol required by calendar year 2015. The study utilized projections of land use in the US and rest of world performed by Informa Economics, LLC, as well as newer estimates of the land use credits of co-products produced by ethanol plants to evaluate possible land use changes.

“On-Road NOx Emission Rates From 1994-2003 Heavy-Duty Trucks”, SAE2008-01-1299, conducted for the Engine Manufacturers Association. This study examined manufacturers consent decree emissions data to determine on-road NOx emission rates, and deterioration in emissions from heavy-duty vehicles. (Peer reviewed publication)

“Evaluation of California Greenhouse Gas Standards and Federal Energy Independence and Security Act - Part 2: CO2 and GHG Impacts”, SAE2008-01-1853, conducted for the Alliance of Automobile Manufacturers. This paper evaluated the comparison of greenhouse gases from cars and light trucks in the US under both the Federal and California GHG policies. (Peer reviewed publication)

“Effectiveness of the California Light Duty Vehicle Regulations as Compared to Federal Regulations”, June 15, 2007. Conducted with NERA Economic Consulting and Sierra Research for The Alliance of Automobile Manufacturers. This study compares the emission benefits of the California and Federal light duty vehicle regulations for HC, CO, NOx, PM, SOx, and Toxics taking into account the difference in emission standards, new vehicle costs and its effect on fleet turnover, new vehicle fuel economy and its effect on vehicle miles traveled, and other factors. Both the EPA MOBILE6 and ARB EMFAC on-road emissions models were used to estimate changes in emissions inventories.

“The Case for a Dual Tech 4 Model Within the California Predictive Model”, May 20, 2007. Conducted with ICF International and Transportation Fuels Consulting for the Renewable Fuels Association (RFA). This study developed separate emissions vs fuel property models for lower and higher Tech 4 (1986-1995) vehicles, and showed that utilizing this alternative Predictive Model would result in a higher compliance margin for fuels containing higher volumes of ethanol. It was thought that this could lead to higher ethanol concentrations in the state, but even if the dual model is not used, it is a better representation of the 2015 inventory than the ARB single model.

“Updated Final Report, Effects of Gasoline Ethanol Blends on Permeation Emissions Contribution to VOC Inventory From On-Road and Off-Road Sources, Inclusion of E-65 Phase 3 Data and Other Updates”, June 20, 2007. Conducted for the American Petroleum Institute. This report updates the earlier March 3, 2005 report for API utilizing data collected by CRC and others since the time of the earlier report.

Final Report, Development of Technical Information for a Regional Fuels Strategy, February 28, 2006. Conducted for the Lake Air Directors Consortium (LADCO). This report provided guidance to the LADCO states (Midwestern states) concerning how to model different types of fuel control programs (in particular) using EPA mobile source models, and how to set up the baseline input files so that results are consistent between the different states.

“Emission Reductions from Changes to Gasoline and Diesel Specifications and Diesel Engine Retrofits in the Southeast Michigan Area”, February 23, 2005. Conducted for the Southeast Michigan Council of Governments (SEMCOG), the Alliance of Automobile Manufacturers, and the American Petroleum Institute. This study examined the on-road and off-road emission benefits of many different possible gasoline and diesel fuel specifications that the state could adopt to help meet the 8-hour ozone standards. This study formed the basis for the state’s move to lower RVP summer gasoline.

“Examination of Temperature and RVP Effects on CO Emissions in EPA’s Certification Database, Final Report”, CRC Project No. E-74a, April 11, 2005. Conducted for the Coordinating Research Council. This study compared CO vs temperature results from the MOBILE6 model to the certification data, and recommended further testing, which is being conducted by the CRC at this time.

“Effects of Gasoline Ethanol Blends on Permeation Emissions Contribution to VOC Inventory From On-Road and Off-Road Sources” March 3, 2005. Conducted for the American Petroleum Institute (API). Using data from the CRC-E-65 program, and data collected by the California EPA and Federal EPA, this study estimated the impacts of ethanol use on increasing permeation VOC emissions from on-road vehicles, off-road equipment and vehicles, and from portable containers. Emission inventory estimates were made for a number of geographical areas including the state of California, and results showed that the permeation effect increases anthropogenic VOC inventories by 2-4%.

Review of EPA Report “A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions”, February 11, 2003. Conducted for the American Petroleum Institute. This study critically examined the methods that EPA used to develop the impacts of biodiesel fuels on HC, CO, NOx, and PM emissions.

“Well-To Wheels Analysis of Advanced Fuel/Vehicle Systems – A North American Study of Energy Use, Greenhouse Gas Emissions, and Criteria Pollutant Emissions”, May 2005. Conducted for General Motors Corporation, with Argonne National Labs. This study examined many different well to wheels pathways for various fuels, and their impacts on GHG and criteria pollutant emissions.

“Potential Delaware Air Emission Impacts of Switching From MTBE to Ethanol in the Reformulated Gasoline Program”, May 26, 2005. Conducted for Lyondell Chemical Company. This study examined the HC, CO, and NOx impacts of switching from MTBE to ethanol.

“Potential Massachusetts Air Emission Impacts of Switching From MTBE to Ethanol in the Reformulated Gasoline Program” June 17, 2005. Conducted for Lyondell Chemical Company. This study is similar to the Delaware study above.

“Potential Maryland Air Emission Impacts of a Ban on MTBE in the Reformulated Gasoline Program”, October 18, 2005. Conducted for Lyondell Chemical Company. This study is similar to the Delaware study above.

“MOBILE6.2C with Ethanol Permeation and Ethanol NOx Effects”, February 8, 2005. Conducted for Health Canada. This study modified the MOBILE6.2C model for ethanol permeation VOC and ethanol NOx effects.

Education

B. Sc., (Materials and Metallurgical Engineering), University of Michigan, Ann Arbor, 1979

Post Graduate Courses (Business Administration), University of Michigan, Ann Arbor, 1982

Donald Victor O'Connor, P. Eng.

Summary

An innovative, achievement oriented business leader with over 40 years experience with energy and environmental issues in Canada. Successfully developed and commercialized environmentally sound energy alternatives.

Background includes:

- Development of the GHGenius life cycle assessment model for energy systems.
- Developing Canada's largest alternative fuel retailing program.
- Establishment of the ethanol industry in Western Canada, from manufacturing to retailing. Extensive experience with production of biofuels.
- Detailed knowledge of fuels and the fuels industry. Technical expertise regarding the utilization of methanol, ethanol, natural gas, propane, hydrogen, gasoline and diesel fuels.
- Developing objectives, strategy and tactics in highly competitive manufacturing and retail industries.

Professional Experience

(S&T)² Consultants Inc. (1998-2018)

President

The firm specializes in energy and environment issues. (S&T)² helps corporations with business development strategies concerning new energy markets and products and it helps governments understand the business, energy and environmental issues of new energy pathways.

Mr. O'Connor has recently provided strategic advice on fuels, transportation issues, and greenhouse gas emissions to a number of Provincial governments, several Canadian Federal Government departments, and international agencies and governments. Mr. O'Connor has also consulted for a number of companies developing new technologies for alternative fuelled vehicles and companies developing new transportation fuel processes and facilities.

Projects have included:

- Development of the GHGenius life cycle assessment model
- Development of the Ontario Ethanol Growth Fund. Led to the establishment of 50% of the Canadian ethanol production capacity.
- Analysis of the US EPA RFS program for the National Biodiesel Board. Resulted in soybean biodiesel passing the GHG emission threshold established by the US Congress.
- Establishment of the qualifying criteria for biofuels under the Alberta RFS program.
- Proposed and participated in the development of a novel, patented process for the production of ethanol from woody lignocellulosic feedstock. Five patents granted.
- Provided guidance and recommendations for the establishment of a biofuels program for the Government of Peru.
- Provided project development services for the development and construction of western Canada's largest fuel ethanol plant.

Mohawk Canada Limited (1981 – 1998)

Mohawk was Western Canada's largest independent automotive fuel retailer offering environmentally responsible fuels and lubricants through 300 retail and bulk facilities. Mohawk also manufactures re-refined lubricants from used oil, and ethanol, distillers' grains and Fibroprotein from grain.

President, COO, and Director, Mohawk Products Ltd. (1997 – 1998)

President, COO, and Director, Mohawk Lubricants Ltd. (1992 – 1998)

Vice President, Supply and Manufacturing (1989 – 1998)

Various positions in R&D, manufacturing and supply (1981-1989)

Donald Victor O'Connor, P. Eng.

Responsibilities:

- Led and managed three business units simultaneously. These units manufactured lubricants from used oil, processed grain into ethanol and human and animal foods, and the corporate supply function covering all aspects of fuels' development, supply and distribution, and core supplier relationships for convenience goods and corporate services. Recommended objectives, strategy and tactics consistent with the organization's values to achieve corporate vision.

Accomplishments:

- Contributed to the development of a vision and unique corporate positioning that allowed the company to increase its market share by 50% over five years;
- Initiated and led the successful introduction of several new or differentiated alternative fuels to the market (Natural Gas, M85, Ethanol blends (Regular Plus and Premium Plus), and premium diesel fuels (Diesel with ECA and Diesel Max);
- Led the turnaround of used oil re-refining business by doubling production and sales over a four-year period. Increased bottom line by 500% and made the operation the most profitable of its kind in the world.
- Introduced a strategic sourcing program throughout the organization.

Additional Professional Activities

- Advisory Committee. ILUC Quantification Study of EU Biofuels. GLOBIOM Model ILUC project.
- Canadian expert on GHG emissions and indirect effects to ISO TC 248 developing ISO 13065.
- Expert Working Group on Indirect Effects. California Air Resources Board. 2010
- Canadian Biomass Innovation Network. External Advisory Panel. 2005-2010.
- Director, B.C. Buildings Corporation. 2000-2002
- Co-Chair 1999-2001. Member, Executive Committee on Cleaner Technology Vehicles (Minister's Committee, B.C. Environment) (1995 - 2001)
- Director, Pound-Maker Adventures (1990 - 1998) An integrated ethanol plant cattle feeding operation in Saskatchewan.
- Director, Canadian Renewable Fuels Association (1990 - 1998, 2000-2002)
- Member, Environment Advisory Committee, Vancouver Foundation (2001-2003)
- Member, Ethanol BC Board (2000-2010)
- Member, Bio-based Products R&D Advisory Council, BIOCAP Canada, (2002-2003)
- Member, National Advisory Committee on Bioenergy (1984 - 1990)
- Member, Efficiency and Alternative Energy Committee, Minister's National Advisory Council to CANMET (1990 - 1994)
- Chair, Ethanol Program Advisory Committee, Agriculture and Agrifood Canada (1992 - 1997)
- Canadian Petroleum Products Institute, Western Division Management Committee (1996 - 1998)
- Numerous presentations on alternative fuels at National and International conferences.

Employment

- Manager, Energy and Environmental Technology, B.H. Levelton & Associates Ltd. Consulting Engineers (1974 - 1981)
- Air Engineer, Province of British Columbia, Pollution Control Branch (1973 - 1974)

Patents

- Mazza; Giuseppe, Gao; Lei, Oomah; B. Dave, O'Connor; Donald, Crowe; Brian. "Functional, water-soluble protein-fibre products from grains". 07/19/2001. U.S. Patent No. 6,261,629.
- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennestad; Gordon, Berlin; Alex, MacLachlan; John Ross. "Continuous counter-current organosolv processing of lignocellulosic feedstocks," 12/16/08, U.S. Patent No. 7,465,791.
- Berlin; Alex, Pye; Edward Kendall, O'Connor; Donald, "Concurrent saccharification and fermentation of fibrous biomass," 11/15/11, U.S. Patent No. 8,058,041.

- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennstad; Gordon, Berlin; Alex, MacLachlan; John Ross, Ma; Raymond. Continuous counter-current organosolv processing of lignocellulosic feedstocks. 6/05/12, U.S. Patent No. 8,193,324.
- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennstad; Gordon, Berlin; Alex, MacLachlan; John Ross, Ma. Continuous counter-current organosolv processing of lignocellulosic feedstocks. 7/24/12, U.S. Patent No. 8,227,004.
- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennstad; Gordon, Berlin; Alex, MacLachlan; John Ross, Ma. Modular system for organosolv fractionation of lignocellulosic feedstock. 10/09/2013. U.S. Patent 8,528,463.
- Hallberg; Christer, O'Connor; Donald, Rushton; Michael, Pye; Edward Kendall, Gjennstad; Gordon, Berlin; Alex, MacLachlan; John Ross, Ma. Continuous counter-current organosolv processing of lignocellulosic feedstocks. US Patent 8,772,427.

Peer Reviewed Papers

- Vuksan, V., Jenkins, D. J., Vidgen, E., Ransom, T. P., Ng, M. K., Culhane, C. T., & O'Connor, D. 1999. A novel source of wheat fiber and protein: effects on fecal bulk and serum lipids-. *The American journal of clinical nutrition*, 69(2), 226-230.
- O'Connor, D., Esteghlalian, A.R., Gregg, D.J. and Saddler, J.N. 2003. Carbon Balance of Ethanol from Wood: The effect of Feedstock Source in Canada. *The Role of Boreal Forests and Forestry in the Global Carbon Budget*. pp. 289-296 (Proceedings of the International Science Conference, Edm. Alta. May 2000).
- Hünenberg, M., Little, S.M., Beauchemin, K.A., McGinn, S.M., O'Connor, D., Okine, E.K., Harstad, O.M., Kröbel, R. and McAllister, T.A., 2014. Feeding high concentrations of corn dried distillers' grains decreases methane, but increases nitrous oxide emissions from beef cattle production. *Agricultural Systems*, 127, pp.19-27.
- Chen, R., Qin, Z., Han, J., Wang, M., Taheripour, F., Tyner, W., O'Connor, D. and Duffield, J., 2018. Life cycle energy and greenhouse gas emission effects of biodiesel in the United States with induced land use change impacts. *Bioresource technology*, 251, pp.249-258.

Education

- Bachelor of Applied Science, Mechanical Engineering, University of British Columbia (1973)

Professional Memberships

- Association of Professional Engineers and Geoscientists of British Columbia
- Association of Professional Engineers of Ontario
- Society of Automotive Engineers

Awards

- Canadian Renewable Fuels Association. Outstanding Dedication to the Advancement of Renewable Fuels in Canada. 2007.

Exhibit “B”

**Comments on Notice of Public Availability of Modified Text and
Availability of Additional Documents and Information Dated June 20, 2018**

**Prepared by Jim Lyons, Trinity Consultants
July 5, 2018**

**CARB's Proposal to Provide "Capacity" Credits for Electric and Fuel Cell Vehicle
Infrastructure is Inappropriate and Should Be Eliminated**

As part of the 15-day notice, CARB proposes to add a new section, 95486.2 to Title 17, California Code of Regulations. The sole purpose of this section is to provide LCFS credits to hydrogen stations and direct current (DC) fast charging stations for the difference in the installed capacity to deliver hydrogen and electricity in addition to the LCFS credits provided for the "fuel" that is actually delivered to and used by vehicles. In more simple terms, what CARB is proposing is to provide LCFS credits to the owners of hydrogen and DC fast charging stations for taking actions that, in and of themselves, do not result in any actual reduction in greenhouse gas (GHG) emissions or in the carbon intensity (CI) of transportation fuels sold in California. Further, CARB staff is proposing to award these LCFS credits that do not result in any reduction in GHG emissions or CI at levels of up to or perhaps slightly beyond 5%¹ of the GHG emissions associated with the use of deficit generating fuels including conventional gasoline and diesel fuel. As is stated on pages 6 and 7 of Appendix F to the 15-day notice, the purpose of these "capacity" credits for hydrogen and DC fast charging stations is not to reduce actual GHG emissions or lowering the CI level of California transportation fuels, but rather "to support the expansions of such infrastructure as directed by Governor's Executive Order B-48-18." It is inappropriate for CARB to allow what are essentially LCFS credits based on the imagined but unverified use of electricity and hydrogen as transportation fuels that will result in no verifiable environmental benefits and which will effectively decrease the actual GHG reductions associated with the LCFS program by up to 5% depending on the year in question and the degree to which applicants request capacity credits.

Further, CARB has not provided any quantification regarding the magnitude of the potential GHG reductions that could be lost through the capacity credits. The question of the potential magnitude of these lost reductions can be easily addressed using CARB's Illustrative Compliance Scenario.² Assuming for purposes of illustration that capacity credits equal to 5% of deficits are distributed in calendar year 2020 and using the other assumptions of CARB's "LD/High ZEV/20%", the potential lost benefits for calendar year

¹ More specifically, up to or slightly more than 2.5% would be allowed for both hydrogen and DC fast charging stations for a total of up to or slightly more than 5% if both options are fully subscribed.

² Available at <https://www.arb.ca.gov/fuels/lcfs/rulemakingdocs.htm>

2020 alone to amount to approximately 820,000 metric tons of GHG emissions³ which at an LCFS credit price of \$100 per metric ton translates into a transfer of roughly \$82,000,000 to owners of hydrogen and DC fast charging stations – again just during calendar year 2020. The potential cumulative value of the transfer of money to owners of hydrogen and DC fast charging stations given the parameters of CARB’s proposed “capacity” credit provisions is clearly much larger than \$82 million.

It should also be noted that the generation of LCFS credits from actions that do not result in direct reductions in GHG emissions through the proposed “capacity” provisions, will decrease the value of LCFS credits generated by other means that do in fact result in actual reductions in GHG emissions. In order to see that this is the case, one only has to recognize that the “capacity” credit provisions will artificially increase the supply of LCFS credits for which there is a finite demand which in turn will decrease the value of all LCFS credits.

In addition to proposing these capacity credits which do not result in any verifiable environmental benefit, CARB has not performed any analysis of the degree to which they will increase the number of hydrogen and DC fast charging stations that are constructed in California and has failed to update the draft Environmental Analysis (EA) to consider those impacts, to date. The construction or modification of new facility will plainly lead to potentially significant environmental effects. This conclusion is recognized, for example, in Table 1-1 of the draft EA, which indicates that the construction or modification of various facilities can lead to “potentially significant and unavoidable” adverse environmental impacts related to:

- Aesthetics;
- Air Quality;
- Biological Resources;
- Cultural Resources;
- Geology and Soil;
- Hydrologic Resources;
- Noise; and
- Traffic and Transportation.

With respect to air quality, the Draft EA provides the following assessment of the impacts that will result from construction of new facilities including hydrogen and DC fast charging stations:

Generally, it is expected that during the construction phase for any facilities, criteria air pollutants and toxic air contaminants (TACs) could be generated from a variety of activities and emission sources. These emissions would be temporary and occur intermittently depending on the intensity of construction on a given day. Site grading and excavation activities would

³ Gasoline deficits for 2020 under this scenario 13.6 million metric tons and diesel deficits are 2.79 million metric tons.

generate fugitive particulate matter (PM) dust emissions, which is the primary pollutant of concern during construction. Fugitive PM dust emissions (e.g., respirable particulate matter [PM10] and fine particulate matter [PM2.5]) vary as a function of several parameters, such as soil silt content and moisture, wind speed, acreage of disturbance area, and the intensity of activity performed with construction equipment. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. Exhaust emissions from construction-related mobile sources could also result in short-term increases in CO, CO2, hydrocarbons, PM, reactive organic gases (ROG), and nitrogen oxides (NOx). These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment.

Further, CARB provides no assessment of how those impacts could or should be mitigated.

Just as the EA has not been revised to address the environmental impacts of “capacity” credit provisions, the economic analysis presented in the ISOR has not been modified to account for the decreases in LCFS credit prices resulting from capacity credits and the associated economic impacts on low CI fuel producers.

As noted above, the potential magnitude of the value of capacity credits could be on the order of tens of millions of dollars per year. Despite this, there is no evidence in the 15-Day Notice justifying the need for creating LCFS credits that provide no reductions in GHG emissions for incentivizing construction of hydrogen and DC fast charging stations. The failure to justify the need for capacity credits is particularly disconcerting in light of the fact that the California Energy Commission (CEC) has spent, and continues to spend, millions of dollars to subsidize hydrogen station construction⁴ as well as the deployment of DC fast charging stations and other electric vehicle infrastructure.⁵ Given this, the appropriate mechanism for increasing the number of hydrogen and DC fast charging stations is to continue to provide grant funding through the CEC’s ARFVT program⁶ not paying owners of hydrogen and DC fast charging stations through the issuance of LCFS credits that provide no verifiable reductions in GHG emissions. However, in the event that CARB does provide capacity credits, then the agency should provide similar “capacity” credits for all types of low CI biofuel infrastructure including E85 refueling facilities.

Given that CARB is proposing a completely new regulatory element in a 15-day notice⁷, it should also be noted that there are alternatives that CARB has failed to consider that would

⁴ See <http://www.energy.ca.gov/2017publications/CEC-600-2017-011/CEC-600-2017-011.pdf>

⁵ See http://www.energy.ca.gov/transportation/tour/ev_infrastructure/

⁶ See <http://www.energy.ca.gov/altfuels/>

⁷ CARB refers to “capacity” credits as “unprecedented and novel” and they are discussed nowhere in the Initial Statement of Reasons for the proposed LCFS amendments.

generate substantial additional amounts of LCFS credits tied to real reductions in GHG emissions and the CI of California transportation fuels. One such alternative would be to allow the sale of E15 in California. Again it is easy to assess the potential GHG reduction benefits from allowing E15 to be sold in California. Using the same example provided above, e.g. CARB's LD/High ZEV/20% scenario for calendar year 2020, and assuming that the credits generated only by starch ethanol increase by 50% (given that the volume of ethanol used will increase by 50% going from E10 to E15), the resulting reduction in GHG emissions would equal 1,126,000 metric tons of GHG emissions from increased use of ethanol plus a further reduction of another 760,000 metric tons of GHG emissions due to reduce use of petroleum based gasoline blendstocks. Again, it is completely unclear why CARB is forgoing the opportunity to generate significant reductions in GHG emissions through allowing the use of E15 while at the same time providing large amounts of LCFS credits to hydrogen and DC fast charging station operators that do not involve a reduction in GHG emissions. Nor has CARB articulated any environmental basis for making these edits in its 15-Day Notice.

CARB's New Proposal for Separate "Sunset" Dates for Biodiesel Mitigation Requirements under the Alternative Diesel Fuel (ADF) Regulation May Lead to Increases in NOx Emissions that Are Not Accounted for in the EA

One element of the CARB staff proposal as documented in the Initial Statement of Reasons⁸ was an extension of the sunset date for the biodiesel NOx mitigation requirements of the ADF regulation found in section 2293.6, Title 17 California Code of Regulations until such time that at least 90% of the hours of operation of diesel fueled non-road engines in the state were accumulated by so called "new technology diesel engines" (NTDEs) which CARB claims erroneously (as documented in detail in Growth Energy's comments on the staff's original proposal) do not experience increases in NOx emissions from the use of biodiesel.

In the 15-day notice, CARB modifies its original proposal to provide for separate sunset dates for the biodiesel NOx mitigation requirements for on-road and non-road diesel vehicles and engines. In addition, Attachment F to the 15-day notice indicates that this change will likely eliminate mitigation requirements for on-road diesel vehicles by calendar year 2023 and for non-road vehicles and engines by 2030. CARB's original proposal would have left the NOx mitigation requirements in place for all biodiesel sold in California until 2030. Despite this major change to the NOx mitigation requirements proposed in the 15-day notice, CARB has provided no analysis of the potential of this change to increase NOx emissions nor any modifications to the draft EA or other regulatory documents (in particular Appendix G to the ISOR) that allows one to determine the potential significance of the change with respect to adverse environmental impacts or even to discern the relative increases in NOx emissions that CARB staff has estimated to result from the use of biodiesel in on-road and non-road vehicles and engines.

⁸ See page III-172 of the ISOR for example.

Despite CARB's failure to analyze the environmental impacts of the proposed change in the NOx mitigation sunset date, it is clear that the change has the potential to increase NOx emissions. First, as noted above, CARB's assumption that there is no increase in NOx emissions from NTDEs is not supported by the available data as documented in detail in Growth Energy's previous comments on the proposed LCFS regulation. Therefore, the shortening of the end of the mitigation period for on-road diesel vehicles from 2030 to 2023 will result in increases in NOx emissions from these vehicles during calendar years 2023 to 2029.

Second, CARB has not proposed any mechanism by which non-mitigated on-road diesel fuel containing biodiesel will be prohibited from introduction into non-road vehicles or engines that do not meet CARB's NTDE definition – a circumstance under which even CARB agrees there would be increases in NOx emissions. For example, the reporting requirements of the ADF regulation do not make any distinction between bio-diesel blends intended for use as on-highway or non-road fuels and there is no explicit prohibition or enforcement mechanism in the ADF regulation against introducing non-mitigated on-highway diesel fuel into any non-road engine. Although dyed non-road diesel fuel is exempt from some state taxes, and is currently less expensive than on-road diesel fuel, some fleets that operate both on- and non-road diesel vehicles and engines may elect to use on-road in all of their vehicles to avoid the need for separate storage and dispensing infrastructure leading to use of non-mitigated biodiesel blends in non-road engines.

Given the above, if CARB truly seeks to impose separate sunset dates, substantial additional modifications to the ADF regulation are required to explicitly protect against the use of non-mitigated on-road fuel in non-road vehicles and engines.

Curriculum Vitae
For
Jim Lyons

AREAS OF SPECIALIZATION

- New Vehicle and Engine Certification
- Development and Assessment of Mobile Source Emission Control Strategies
- Development and Assessment of Strategies for Reduction of Criteria Pollutant and GHG Emissions Related to Transportation Fuels – Including Alternative Fuels and Fuel Additives
- Design and Implementation of Vehicle Testing Programs and Data Analysis
- Enforcement and Litigation Support Related to Mobile Sources and Transportation Fuels
- Intellectual Property Disputes Involving Engine and Emission Control System Design, Function, and Novelty
- Tracking and Reporting of California Air Resources Board Activities Related to the Regulation of Mobile Source Emissions and Transportation Fuels
- Emission Inventories and Quantification

EDUCATION

M.S., Chemical Engineering, University of California, Los Angeles

B.S., Cum Laude, Chemistry, University of California, Irving

AFFILIATIONS

Society of Automotive Engineers
American Chemical Society

TECHNICAL EXPERTISE

Fuels Regulations. Managed numerous projects related to assessments of Low Carbon Fuel Standard (LCFS) regulations adopted or being prepared by California and a number of other jurisdictions. Has also been involved in the review of reformulated gasoline and diesel fuel regulations, including the federal RFS 1, RFS 2, and Tier 3 regulations.

Mobile Source Emissions Control. Participated in the design and evaluation of mobile source emission control measures and emission control systems; development of mobile source emissions modeling software; development of mobile source emission inventories; design and management of supporting field and laboratory studies; and the design and evaluation of vehicle emissions inspection and maintenance programs. Mobile source categories include on- and off-road vehicles, locomotives, marine vessels, and aircraft. Directly involved in assessing changes in vehicle technology required to comply

SUMMARY OF EXPERIENCE

A Principal Consultant and head of Trinity's Mobile Source and Fuels team, Mr. Lyons has extensive experience related to fuels issues and emissions, including the emission impacts of changes in gasoline and diesel fuel composition and substitution of alternative fuels for petroleum-based fuels. Specific projects have required work on issues related to the emissions impacts of changes in gasoline and diesel fuel as well as compliance with California Air Resources Board (CARB) and U.S. EPA regulations related to gasoline and diesel fuel properties and specifications, assessment of costs and benefits of alternative fuels and alternatively fueled vehicles, and direct involvement in analyses of issues related to CARB and EPA fuels regulations, including the Renewable Fuel Standards (RFS) and Low Carbon Fuel Standards. He has also provided expert services in fuels-related litigations.

Additional responsibilities include oversight and execution of complex analyses of the emission benefits, costs, and cost-effectiveness of mobile source air pollution control measures. Mr. Lyons has developed particular expertise with respect to the assessment of control measures involving accelerated vehicle/engine retirement programs; the deployment of advanced emission control systems, including electric fuel cell and hybrid technologies for on- and non-road gasoline- and diesel-powered vehicles and engines, as well as on-vehicle evaporative and refueling emission control systems. Other duties include assessments of the activities of federal, state, and local regulatory agencies with respect to motor vehicle emissions and reports to clients regarding those activities. Mr. Lyons has extensive litigation experience related to air quality and fuels including gasoline property and renewable fuels regulations, product liability, and intellectual property issues.

James Lyons

Principal Consultant — Sacramento Office



with federal, California, and Mexican new-vehicle greenhouse gas and fuel economy standards for light-duty vehicles.

New Vehicle and Engine Certification. Directly participated in and managed efforts related to obtaining U.S. EPA and California Air Resources Board certification for new engines and vehicles, including activities related to agency enforcement actions and on-going compliance requirements.

Air Quality Planning and Strategy Development. Has been involved in the development and critical assessment of mobile source and transportation fuels elements of State Implementation Plans.

Emission Control System Design and Evaluation. Provided support for the design and assessment of alternative emission control techniques, and for troubleshooting control system issues. Issues assessed have include VOC, CO, NOx, SOx, and PM control systems in various applications.

Expert Witness Services. Presented testimony and served as an expert or consulting expert on numerous cases in federal and state courts involving issues related to government regulations affecting mobile source certifications, in-use emissions issues, fuel regulations, intellectual property issues related to emission controls and fuels, and product liability.

EMPLOYMENT HISTORY

2014 – Present Trinity Consultants

1991 – 2014 Sierra Research

1985 – 1991 California Air Resources Board

SELECTED PUBLICATIONS (AUTHOR OR CO-AUTHOR)

"Follow-On Study of Transportation Fuel Life Cycle Analysis: Review of Current CARB and EPA Estimates of Land Use Change (LUC) Impacts," Sierra Research Report No. SR2016-08-01, prepared for the Coordinating Research Council, CRC Project No. E-88-3b, August 2016.

"Review of EPA's MOVES2014 Model," Sierra Research Report No. SR2016-07-01, prepared for the Coordinating Research Council, CRC Project No. E-101, July 2016.

"Development of Vehicle Attribute Forecasts for the '2015 Integrated Energy Policy Report,'" prepared for the California Energy Commission, February 5, 2016.

"Sensitivity Analysis of Key Assumptions on Energy and Environmental Economics (E3) 'California Pathways GHG Scenario Results' as They Pertain to the Light-Duty Vehicle Sector," prepared for the Alliance of Automobile Manufacturers, October 2015.

"Review of Energy and Environmental Economics (E3) 'California Pathways GHG Scenario Results' as They Pertain to the Light-Duty Vehicle Sector," prepared for the Alliance of Automobile Manufacturers, October 2015.

"International Light-Duty Vehicle Fuel Economy and Greenhouse Gas Standards Analysis," prepared for the Alliance of Automobile Manufacturers, July 2015.

"Quantifying Aircraft Lead Emissions at Airports," prepared for the Transportation Research Board, Airport Cooperative Research Program, October 2014.

"Best Practices Guidebook for Preparing Lead (Pb) Emission Inventories from Piston-Powered Aircraft," prepared for the Transportation Research Board, Airport Cooperative Research Program, October 2014.

"Development of Vehicle Attribute Forecasts for 2013 IEPR," Sierra Research Report No. SR2014-01-01, prepared for the California Energy Commission, January 2014.

"Assessment of the Emission Benefits of U.S. EPA's Proposed Tier 3 Motor Vehicle Emission and Fuel Standards," Sierra Research Report No. SR2013-06-01, prepared for the American Petroleum Institute, June 2013.

"Development of Inventory and Speciation Inputs for Ethanol Blends," Sierra Research Report No. SR2012-05-01, prepared for the Coordinating Research Council, Inc. (CRC), May 2012.

"Review of CARB Staff Analysis of 'Illustrative' Low Carbon Fuel Standard (LCFS) Compliance Scenarios," Sierra Research Report No. SR2012-02-01, prepared for the Western States Petroleum Association, February 20, 2012.

"Review of CARB On-Road Heavy-Duty Diesel Emissions Inventory," Sierra Research Report No. SR2010-11-01, prepared for The Ad Hoc Working Group, November 2010.

"Identification and Review of State/Federal Legislative and Regulatory Changes Required for the Introduction of New Transportation Fuels," Sierra Research Report No. SR2010-08-01, prepared for the American Petroleum Institute, August 2010.

"Technical Review of EPA Renewable Fuel Standard Program (RFS2) Regulatory Impact Analysis for Non-GHG Pollutants," Sierra Research Report No. SR2010-05-01, prepared for the American Petroleum Institute, May 2010.

"Effects of Gas Composition on Emissions from Heavy-Duty Natural Gas Engines," Sierra Research Report No. SR2010-02-01, prepared for the Southern California Gas Company, February 2010.

"Effects of Gas Composition on Emissions from a Light-Duty Natural Gas Vehicle," Sierra Research Report No. SR2009-11-01, prepared for the Southern California Gas Company, November 2009.

"Technical Review of 2009 EPA Draft Regulatory Impact Analysis for Non-GHG Pollutants Due to Changes to the Renewable Fuel Standard," Sierra Research Report No. SR2009-09-01, prepared for the American Petroleum Institute, September 2009.

"Effects of Vapor Pressure, Oxygen Content, and Temperature on CO Exhaust Emissions," Sierra Research Report No. 2009-05-03, prepared for the Coordinating Research Council, May 2009.

"Technical Review of 2007 EPA Regulatory Impact Analysis Methodology for the Renewable Fuels Standard," Sierra Research Report No. 2008-09-02, prepared for the American Petroleum Institute, September 2008.

James Lyons

Principal Consultant – Sacramento Office



"Impacts of MMT Use in Unleaded Gasoline on Engines, Emission Control Systems, and Emissions," Sierra Research Report No. 2008-08-01, prepared for McMillan Binch Mendelsohn LLP, Canadian Vehicle Manufacturers' Association, and Association of International Automobile Manufacturers of Canada, August 2008.

"Attachment to Comments Regarding the NHTSA Proposal for Average Fuel Economy Standards Passenger Cars and Light Trucks Model Years 2011-2015, Docket No. NHTSA-2008-0089," Sierra Research Report No. SR2008-06-01, prepared for the Alliance of Automobile Manufacturers, June 2008.

"Evaluation of California Greenhouse Gas Standards and Federal Energy Independence and Security Act – Part 1: Impacts on New Vehicle Fuel Economy," SAE Paper No. 2008-01-1852, Society of Automotive Engineers, 2008.

"Basic Analysis of the Cost and Long-Term Impact of the Energy Independence and Security Act Fuel Economy Standards," Sierra Research Report No. SR 2008-04-01, April 2008.

"The Benefits of Reducing Fuel Consumption and Greenhouse Gas Emissions from Light-Duty Vehicles," SAE Paper No. 2008-01-0684, Society of Automotive Engineers, 2008.

"Assessment of the Need for Long-Term Reduction in Consumer Product Emissions in South Coast Air Basin," Sierra Research Report No. 2007-09-03, prepared for the Consumer Specialty Products Association, September 2007.

"Summary of Federal and California Subsidies for Alternative Fuels," Sierra Research Report No. SR2007-04-02, prepared for the Western States Petroleum Association, April 2007.

"Analysis of IRTA Report on Water-Based Automotive Products," Sierra Research Report No. SR2006-08-02, prepared for the Consumer Specialty Projects Association and Automotive Specialty Products Alliance, August 2006.

"Evaluation of Pennsylvania's Implementation of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2006-04-01, prepared for Alliance of Automobile Manufacturers, April 12, 2006.

"Evaluation of New Jersey's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-09-03, prepared for the Alliance of Automobile Manufacturers, September 30, 2005.

"Evaluation of Vermont's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-09-02, prepared for the Alliance of Automobile Manufacturers, September 19, 2005.

"Assessment of the Cost-Effectiveness of Compliance Strategies for Selected Eight-Hour Ozone NAAQS Nonattainment Areas," Sierra Research Report No. SR2005-08-04, prepared for the American Petroleum Institute, August 30, 2005.

"Evaluation of Connecticut's Adoption of California's Greenhouse Gas Regulations on Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-08-03, prepared for the Alliance of Automobile Manufacturers, August 26, 2005.

"Evaluation of New York's Adoption of California's Greenhouse Gas Regulations On Criteria Pollutants and Precursor Emissions," Sierra Research Report No. SR2005-07-04, prepared for the Alliance of Automobile Manufacturers, July 14, 2005.

"Review of MOVES2004," Sierra Research Report No. SR2005-07-01, prepared for the Alliance of Automobile Manufacturers, July 11, 2005.

"Review of Mobile Source Air Toxics (MSAT) Emissions from On-Highway Vehicles: Literature Review, Database, Development, and Recommendations for Future Studies," Sierra Research Report No. SR2005-03-01, prepared for the American Petroleum Institute, March 4, 2005.

"The Contribution of Diesel Engines to Emissions of ROG, NOx, and PM2.5 in California: Past, Present, and Future," Sierra Research Report No. SR2005-02-01, prepared for Diesel Technology Forum, February 2005.

"Fuel Effects on Highway Mobile Source Air Toxics (MSAT) Emissions," Sierra Research Report No. SR2004-12-01, prepared for the American Petroleum Institute, December 23, 2004.

"Review of the August 2004 Proposed CARB Regulations to Control Greenhouse Gas Emissions from Motor Vehicles: Cost Effectiveness for the Vehicle Owner or Operator – Appendix C to the Comments of The Alliance of Automobile Manufacturers," Sierra Research Report No. SR2004-09-04, prepared for the Alliance of Automobile Manufacturers, September 2004.

"Emission and Economic Impacts of an Electric Forklift Mandate," Sierra Research Report No. SR2003-12-01, prepared for National Propane Gas Association, December 12, 2003.

"Reducing California's Energy Dependence," Sierra Research Report No. SR2003-11-03, prepared for Alliance of Automobile Manufacturers, November 25, 2003.

"Evaluation of Fuel Effects on Nonroad Mobile Source Air Toxics (MSAT) Emissions: Literature Review, Database Development, and Recommendations for Future Studies," Sierra Research Report No. SR2003-10-01, prepared for American Petroleum Institute, October 3, 2003.

"Review of Current and Future CO Emissions from On-Road Vehicles in Selected Western Areas," Sierra Research Report No. SR03-01-01, prepared for the Western States Petroleum Association, January 2003.

"Review of CO Compliance Status in Selected Western Areas," Sierra Research Report No. SR02-09-04, prepared for the Western States Petroleum Association, September 2002.

"Impacts Associated With the Use of MMT as an Octane Enhancing Additive in Gasoline – A Critical Review", Sierra Research Report No. SR02-07-01, prepared for Canadian Vehicle Manufacturers Association and Association of International Automobile Manufacturers of Canada, July 24, 2002.

"Critical Review of 'Safety Oversight for Mexico-Domiciled Commercial Motor Carriers, Final Programmatic Environmental Assessment', Prepared by John A Volpe Transportation Systems Center, January 2002," Sierra Research Report No. SR02-04-01, April 16, 2002.

James Lyons

Principal Consultant — Sacramento Office



"Critical Review of the Method Used by the South Coast Air Quality Management District to Establish the Emissions Equivalency of Heavy-Duty Diesel- and Alternatively Fueled Engines", Sierra Research Report No. SR01-12-03, prepared for Western States Petroleum Association, December 21, 2001.

"Review of U.S. EPA's Diesel Fuel Impact Model", Sierra Research Report No. SR01-10-01, prepared for American Trucking Associations, Inc., October 25, 2001.

"Operation of a Pilot Program for Voluntary Accelerated Retirement of Light-Duty Vehicles in the South Coast Air Basin," Sierra Research Report No. SR01-05-02, prepared for California Air Resources Board, May 2001.

"Comparison of Emission Characteristics of Advanced Heavy-Duty Diesel and CNG Engines," Sierra Report No. SR01-05-01, prepared for Western States Petroleum Association, May 2001.

"Analysis of Southwest Research Institute Test Data on Inboard and Sterndrive Marine Engines," Sierra Report No. SR01-01-01, prepared for National Marine Manufacturers Association, January 2001.

"Institutional Support Programs for Alternative Fuels and Alternative Fuel Vehicles in Arizona: 2000 Update," Sierra Report No. SR00-12-04, prepared for Western States Petroleum Association, December 2000.

"Real-Time Evaporative Emissions Measurement: Mid-Morning Commute and Partial Diurnal Events," SAE Paper No. 2000-01-2959, October 2000.

"Evaporative Emissions from Late-Model In-Use Vehicles," SAE Paper No. 2000-01-2958, October 2000.

"A Comparative Analysis of the Feasibility and Cost of Compliance with Potential Future Emission Standards for Heavy-Duty Vehicles Using Diesel or Natural Gas," Sierra Research Report No. SR00-02-02, prepared for Californians For a Sound Fuel Strategy, February 2000.

"Critical Review of the Report Entitled 'Economic Impacts of On Board Diagnostic Regulations (OBD II)' Prepared by Spectrum Economics," Sierra Research Report No. SR00-01-02, prepared for the Alliance of Automobile Manufacturers, January 2000.

"Potential Evaporative Emission Impacts Associated with the Introduction of Ethanol-Gasoline Blends in California," Sierra Research Report No. SR00-01-01, prepared for the American Methanol Institute, January 2000.

"Evaporative Emissions from Late-Model In-Use Vehicles," Sierra Research Report No. SR99-10-03, prepared for the Coordinating Research Council, October 1999.

"Investigation of Sulfur Sensitivity and Reversibility in Late-Model Vehicles," SAE Paper No. 1999-01-3676, August 1999.

"Future Diesel-Fueled Engine Emission Control Technologies and Their Implications for Diesel Fuel Properties," Sierra Research Report No. SR99-08-01, prepared for the American Petroleum Institute, August 1999.

James Lyons

Principal Consultant — Sacramento Office



"Analysis of Compliance Feasibility under Proposed Tier 2 Emission Standards for Passenger Cars and Light Trucks," Sierra Research Report No. SR99-07-02, July 1999.

"Comparison of the Properties of Jet A and Diesel Fuel," Sierra Research Report No. SR99-02-01, prepared for Pillsbury Madison and Sutro, February 1999.

"Investigation of Sulfur Sensitivity and Reversibility in Late-Model Vehicles," Sierra Research Report No. SR98-12-02, prepared for the American Petroleum Institute, December 1998.

"Analysis of New Motor Vehicle Issues in the Canadian Government's Foundation Paper on Climate Change – Transportation Sector," Sierra Research Report No. SR98-12-01, prepared for the Canadian Vehicle Manufacturers Association, December 1998.

"Investigation of the Relative Emission Sensitivities of LEV Vehicles to Gasoline Sulfur Content - Emission Control System Design and Cost Differences," Sierra Research Report No. SR98-06-01, prepared for the American Petroleum Institute, June 1998.

"Costs, Benefits, and Cost-Effectiveness of CARB's Proposed Tier 2 Regulations for Handheld Equipment Engines and a PPEMA Alternative Regulatory Proposal," Sierra Research Report No. SR98-03-03, prepared for the Portable Power Equipment Manufacturers Association, March 1998.

"Analysis of Diesel Fuel Quality Issues in Maricopa County, Arizona," Sierra Research Report No. SR97-12-03, prepared for the Western States Petroleum Association, December 1997.

"Potential Impact of Sulfur in Gasoline on Motor Vehicle Pollution Control and Monitoring Technologies," prepared for Environment Canada, July 1997.

"Analysis of Mid- and Long-Term Ozone Control Measures for Maricopa County," Sierra Research Report No. SR96-09-02, prepared for the Western States Petroleum Association, September 9, 1996.

"Technical and Policy Issues Associated with the Evaluation of Selected Mobile Source Emission Control Measures in Nevada," Sierra Research Report No. SR96-03-01, prepared for the Western States Petroleum Association, March 1996.

"Cost-Effectiveness of Stage II Vapor Recovery Systems in the Lower Fraser Valley," Sierra Research Report No. SR95-10-05, prepared for the Province of British Columbia Ministry of Environment Lands and Parks and the Greater Vancouver Regional District, October 1995.

"Cost of Stage II Vapor Recovery Systems in the Lower Fraser Valley," Sierra Research Report No. SR95-10-04, prepared for the Province of British Columbia Ministry of Environment Lands and Parks and the Greater Vancouver Regional District, October 1995.

"A Comparative Characterization of Gasoline Dispensing Facilities With and Without Vapor Recovery Systems," Sierra Research Report No. SR95-10-01, prepared for the Province of British Columbia Ministry of Environment Lands and Parks, October 1995.

"Potential Air Quality Impacts from Changes in Gasoline Composition in Arizona," Sierra Research Report No. SR95-04-01, prepared for Mobil Corporation, April 1995.

"Vehicle Scrappage: An Alternative to More Stringent New Vehicle Standards in California," Sierra Research Report No. SR95-03-02, prepared for Texaco, Inc., March 1995.

"Evaluation of CARB SIP Mobile Source Measures," Sierra Research Report No. SR94-11-02, prepared for Western States Petroleum Association, November 1994.

"Reformulated Gasoline Study," prepared by Turner, Mason & Company, DRI/McGraw-Hill, Inc., and Sierra Research, Inc., for the New York State Energy Research and Development Authority, Energy Authority Report No. 94-18, October 1994.

"Phase II Feasibility Study: Heavy-Duty Vehicle Emissions Inspection Program in the Lower Fraser Valley," Sierra Research Report No. SR94-09-02, prepared for the Greater Vancouver Regional District, September 1994.

"Cost-Effectiveness of Mobile Source Emission Controls from Accelerated Scrappage to Zero Emission Vehicles," Paper No. 94-TP53.05, presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, OH, June 1994.

"Investigation of MOBILE5a Emission Factors, Assessment of I/M Program and LEV Program Emission Benefits," Sierra Research Report No. SR94-06-05, prepared for American Petroleum Institute, June 1994.

"Cost-Effectiveness of the California Low Emission Vehicle Standards," SAE Paper No. 940471, 1994.

"Meeting ZEV Emission Limits Without ZEVs," Sierra Research Report No. SR94-05-06, prepared for Western States Petroleum Association, May 1994.

"Evaluating the Benefits of Air Pollution Control - Method Development and Application to Refueling and Evaporative Emissions Control," Sierra Research Report No. SR94-03-01, prepared for the American Automobile Manufacturers Association, March 1994.

"The Cost-Effectiveness of Further Regulating Mobile Source Emissions," Sierra Research Report No. SR94-02-04, prepared for the American Automobile Manufacturers Association, February 1994.

"Searles Valley Air Quality Study (SVAQS) Final Report," Sierra Research Report No. SR94-02-01, prepared for North American Chemical Company, February 1994.

"A Comparative Study of the Effectiveness of Stage II Refueling Controls and Onboard Refueling Vapor Recovery," Sierra Research Report No. SR93-10-01, prepared for the American Automobile Manufacturers Association, October 1993.

"Evaluation of the Impact of the Proposed Pole Line Road Overcrossing on Ambient Levels of Selected Pollutants at the Calgene Facilities," Sierra Research Report No. SR93-09-01, prepared for the City of Davis, September 1993.

"Leveling the Playing Field for Hybrid Electric Vehicles: Proposed Modifications to CARB's LEV Regulations," Sierra Research Report No. SR93-06-01, prepared for the Hybrid Vehicle Coalition, June 1993.

James Lyons

Principal Consultant — Sacramento Office



"Size Distributions of Trace Metals in the Los Angeles Atmosphere," *Atmospheric Environment*, Vol. 27B, No. 2, pp. 237-249, 1993.

"Preliminary Feasibility Study for a Heavy-Duty Vehicle Emissions Inspection Program in the Lower Fraser Valley Area," Sierra Research Report No. 92-10-01, prepared for the Greater Vancouver Regional District, October 1992.

"Development of Mechanic Qualification Requirements for a Centralized I/M Program," SAE Paper No. 911670, 1991.

"Cost-Effectiveness Analysis of CARB's Proposed Phase 2 Gasoline Regulations," Sierra Research Report No. SR91-11-01, prepared for the Western States Petroleum Association, November 1991.

"Origins and Control of Particulate Air Toxics: Beyond Gas Cleaning," in Proceedings of the Twelfth Conference on Cooperative Advances in Chemical Science and Technology, Washington, D.C., October 1990.

"The Effect of Gasoline Aromatics on Exhaust Emissions: A Cooperative Test Program," SAE Paper No. 902073, 1990.

"Estimation of the Impact of Motor Vehicles on Ambient Asbestos Levels in the South Coast Air Basin," Paper No. 89-34B.7, presented at the 82nd Annual Meeting of the Air and Waste Management Association, Anaheim, CA, June 1989.

"Benzene/Aromatic Measurements and Exhaust Emissions from Gasoline Vehicles," Paper No. 89-34B.4, presented at the 82nd Annual Meeting of the Air and Waste Management Association, Anaheim, CA, June 1989.

"The Impact of Diesel Vehicles on Air Pollution," presented at the 12th North American Motor Vehicle Emissions Control Conference, Louisville, KY, April 1988.

"Exhaust Benzene Emissions from Three-Way Catalyst-Equipped Light-Duty Vehicles," Paper No. 87-1.3, presented at the 80th Annual Meeting of the Air Pollution Control Association, New York, NY, June 1987.

"Trends in Emissions Control Technologies for 1983-1987 Model-Year California-Certified Light-Duty Vehicles," SAE Paper No. 872164, 1987.

Exhibit “C”

COMMENTS ON THE JUNE 20, 2016 PROPOSED MODIFICATIONS

Prepared by:
H-D Systems
Washington, D.C.
July 3, 2018

OVERVIEW

The Energy Efficiency ratio (EER) is the ratio of energy use by the alternative fuel vehicle to the energy used by a similar conventional vehicle per unit travel distance. The ARB has documented the EER values for several alternative fuel vehicle types in Appendix H of the 2018 Initial Statement of Reasons (ISOR) for amendments to the LCFS. H-D Systems had submitted a report which examined the EER values in Appendix H of the ISOR to assess its reasonableness using both an engineering analysis and an assessment of the similarity of vehicle types and tests used to generate the data underlying the EER. The ARB has published modifications to the ISOR in its recent June 20th proposed 15-day modifications to the original proposal detailed in the ISOR. Unfortunately, the ARB's proposed modifications have largely retained the original EER values or changed them in a directionally incorrect way, and the ARB does not appear to have reviewed the H-D Systems' report submitted in response to the ISOR. In addition, new EER values have been proposed for cargo handling vehicles at ports, and the EER for auxiliary engines in ocean-going vessels while docked at port.

SUMMARY OF EARLIER RECOMMENDATIONS

Our earlier report had provided analyses that suggested that reducing many of the EER values contained in the ISOR. The main reasons for these suggested reductions are

- The EER values for CNG vehicles do not account for the bulky tanks to carry CNG which reduce the energy efficiency of the vehicles and reduce payload capacity for cargo vehicles.
- The EER values for battery electric vehicles do not account for the significant energy loss under cold ambient conditions and for the loss of payload capacity due to the weight of the batteries.
- The EER values for many passenger vehicles, both light and heavy duty, do not account for the heating, ventilation and air conditioning loads that can have much more serious impacts on electric vehicle efficiency relative to conventional gasoline and diesel vehicles
- There are inconsistencies in the proposed EER for some of the vehicle types when comparing the proposed values in relation to diesel versus gasoline vehicles.
- The EER values for fuel cell vehicles are not consistent with vehicle fuel economy certification data.

The earlier results are summarized in the table below from the H-D Systems report to which the values published in Table 1, Appendix A of the June 20th document have been added. As can be seen, some of the newer values have been increased rather than decreased from those published in the ISOR. ARB has not provided any rationale for the changes and has not addressed any of the issues raised in the H-D Systems report.

Vehicle Type	EER published in ARB ISOR	EER in Appendix A of the June 20 th ARB Proposal	Suggested Correction in H-D System Report
Battery Electric Cars (LDV)	3.0	3.4	2.7, could be reduced by 10 to 15% in summer and winter
Battery Electric Light Duty Trucks (LDT)	3.0	3.4	2.7, plus payload reduction in cargo trucks
Hydrogen Fuel Cell LDV	2.3	2.5	About 2.0, weather effects unknown
CNG LDV/LDT	1.0	1.0	0.9 for aftermarket conversions
LPG Bus	0.9	0.9	0.74 at urban speeds (<20 mph)
Electric TRU	3.4	3.4	ARB data too variable for conclusion
Electric Motorcycles	4.4	4.4	Probably closer to 3.5, need data
Electric Bus	4.8 at urban speed	5.0?	About 3 as an all-season average
Parcel and Drayage Trucks	4 to 5.5	5.0?	Payload loss, seasonal effects and diesel idle shutoff not accounted for.

The revisions made by ARB to the EER values in the table above are not documented in any of the appendices to the June 20th Proposed Modifications.

ADDITIONAL CATEGORIES WITH EER VALUES

Attachment D to the June 20th Proposed Modifications lists EER values for Cargo Handling Equipment and Ocean-going Vessels. Limited documentation is provided for the EER values derived in Attachment D.

Cargo Handling Equipment

The derivation of EER values for cargo-handling equipment is based on a modeled relationship between engine efficiency and load factor. The average load factor for different cargo handling equipment is based on load factors used for emission inventories and from recent work for the Port of Los Angeles. The documentation states that CARB's EER calculation methods assume no losses of energy during battery charging or conversion of energy to useful work. To be consistent with prior calculation methods, staff assumed no losses for electrical non-yard truck equipment, i.e. the efficiency is 100%. Therefore, the inverse of diesel engine efficiency is used to estimate EERs for the ratio of electrical equipment to diesel equipment.

ARB utilizes a model to estimate the efficiency of a diesel engine as a function of the load factor imposed on the engine. While the modeled relationship between diesel engine efficiency and load factor is consistent with engineering principles, there is little documentation on the load factors listed by equipment type in Appendix D. Table 1 of Appendix D also lists an "hours of operation" by equipment type that is footnoted but the footnote itself is missing. It is unclear what the hours of operation refers to as it varies by equipment type from 1900 to 401,633 so it is clearly not the annual use rate.

The load factors span the range from 0.2 to 0.59 but the derived EER is 2.6. Since the EER is the inverse of engine efficiency, the estimated average efficiency is $1/2.6$ or 38.5%. The peak efficiency (the highest value) for a diesel engine, which typically occurs at load factors of 0.85 to 0.9, is 41% to 42% so that an operating average efficiency so close to the maximum value seems unreasonably high. Appendix D also states that diesels operate at average efficiency between 30 and 35%, so that the EER is inconsistent with ARB's own findings.

It is unclear why the ARB assumes no losses of energy during battery charging or conversion of energy to useful work for electric equipment, as these losses are about 20 to 25% of total energy use (about 5% to 8% in battery charge-discharge and 15 to 18% in motor and controller losses). The high average efficiency of the diesel engine indicated by the EER is also of concern and both assumptions should be reviewed.

Ocean Going Vessels (OGV)

When OGVs are "at-berth," or docked in a harbor, an auxiliary diesel engine(s) provides electrical power for equipment used while the vessel is at rest. Power needs while at-berth

include support for on-board electronics, lighting, ballast pumps, ventilation systems, and air-conditioning. The ARB analysis quantifies an aggregated EER value for a wide range of auxiliary engines on all types of ships that call California ports (but does not include/pertain to boilers that are used in some vessels instead of diesel engines). The recommended EER quantifies the increased energy efficiency of using shore power instead of using the conventional on-board auxiliary diesel engine. The analysis assumes all of the electric energy would be provided by the local utility even though some California ports are able to generate a portion of their own electricity. The potential differences in carbon intensity between power self-generated by the port and power from the grid is ignored in the EER calculation. For consistency with prior EER calculations, ARB staff also assumed that shore power is 100% energy efficient. Hence, the EER is simply the inverse of auxiliary engine efficiency, similar to the methodology used for cargo handling equipment.

Not surprisingly, the EER computed by ARB is 2.6 for OGV, which is identical to the one for cargo handling equipment. The EER estimate is based on data from a consultants' report¹ on the emissions from vessels at the Port of Long Beach, and this report lists both emissions and electric power generated by the vessels while docked. In this report, the electric power generated by ships was computed from assumptions about hoteling loads and the CO₂ emission estimates were derived by using estimates of fuel consumption versus load for the auxiliary engines. Since both fuel consumption and electric power are not based on measured values but are estimated values using an assumed efficiency, the EER calculation performed by ARB uses these estimates to simply reproduce the original assumption of engine efficiency made by the consultants.

In the case of OGV, the auxiliary engine provides electric power which is replaced by power from the grid, so that the ARB methodology of using the inverse of engine efficiency for EER is defensible for OGV auxiliary power. However, the data from which the EER is estimated by ARB are not based on actual measurements but on a set of assumptions employed by the consultants to the Port of Long Beach. The ARB methodology should rely on actual data from auxiliary engine tests or actual measurements of power output and fuel consumption by OGV auxiliary engines.

¹ Starcrest Consulting Group, Port of Long Beach 2016 Air Emissions Inventory, July 2017

Curriculum Vitae
For
K.G. Duleep

K.G. Duleep
President, H-D Systems

EDUCATION

M.B.A., Finance, Wharton School, University of Pennsylvania, Philadelphia, PA, 1989

Doctoral Candidate, Aerospace Engineering – Combustion, University of Michigan, Ann Arbor, MI, 1976

M.S., Aerospace Engineering/Computer Information and Control Engineering, University of Michigan, Ann Arbor, MI, 1975

Bachelor of Technology, Aerospace Engineering, Indian Institute of Technology, Madras, India 1972

EXPERIENCE OVERVIEW

K.G. Duleep is President of H-D Systems, a new consulting firm which is a spin-off of the EEA automotive technology group, in the Washington, DC metropolitan area. His extensive work on vehicle energy use, cost and performance of fuels and engine technology and manufacturing costs have been widely cited around the world. Through his work, he meets periodically with the technical staffs of most of the world's largest auto-manufacturers to discuss new technology and has obtained key insights on vehicle development through this process. He is well known for his work on vehicle fuel economy technology and his CAFE forecasts under alternative scenarios have been the basis for many regulatory and policy discussions in Congress. In 2008/9, he directed analyses as a support contractor to the National Academy of Sciences Committee on Fuel Economy Standards, and he is currently involved in the new CAFE standards for the post-2016 time frame. He has also performed studies on life cycle energy use and the energy use in vehicle manufacturing. He was the developer of the fuel economy forecasting algorithm embedded in NEMS, which he and his group has updated periodically.

PROJECT EXPERIENCE

Fuel Economy Modeling and Forecasting, EIA and CEC, 1990 –Present. Developed detailed forecasting models of light and heavy vehicle fuel economy that are modules within the NEMS model and the CALCARS models. Models were periodically updated by Mr. Duleep over the last 20 years.

Automotive Technology Cost Analysis, Department of Energy, ongoing. Direct multi-year task order contract with DOE'S Policy Office to evaluate costs and benefits of new automotive technologies. Also serve as technical lead on advanced engine technology analysis. Coordinate efforts of two major subcontractors. Most recent project in 2014-15 covered engine technology potential from use of 98 octane E25 (25% ethanol) blends.

Technology Planning, U.S. Oil Refiners, Japanese Auto manufacturers, 1996–Present.

Provides technology planning and emissions compliance support to oil refiners and import auto manufacturers. The work involves detailed assessment of new technology for vehicles and estimation of their impact on vehicle fuel economy, cost, drivability and reliability. Forecast of technology penetration in different markets and segments of the fleet are also part of the services provided.

Alternative Fuels Outlook, California Energy Commission, Led the study of alternative fuel vehicles as a means of reaching California's GHG reduction goals. Reported on the current state of vehicles and forecasted the economic viability of alternative fuels in the state considering potential roadblocks such as higher costs and increased weight. Estimated the required capital requirements for any incremental infrastructure that may be necessary. Provided strategic recommendations on investment priorities and mechanisms to accelerate commercialization of alternative fuels and technologies.

Analysis of Fuel Cell/ Hydrogen Power in Non-Automotive Markets, US DOE, 2009-2010.

Examined the potential for PEM fuel cells in diverse markets like stand-by power, fork lift trucks, and combined residential heat and power for the US. Work was a follow-on to a market penetration analysis for fuel cells in automotive markets.

An overview of Electric Vehicles and Plug-in Hybrid Electric Vehicles, European

Commission Directorate-General Environment. Provided consultation to the EU concerning the impacts of an attributes-based standard such as weight-based standards on fuel economy and GHG emissions. Created a simple model that could verify the results of a very complex model with hundreds of inputs.

Analysis of Light Duty Vehicle Weight Reduction Potential, Department of Energy,

Directed a large scope of study focusing on weight reduction technologies as capable of significant fuel economy improvement at potentially low costs. Utilized the staff capabilities developed in this area as a result of weight reduction analysis for the US EPA, California Air Resources Board (ARB) and other clients. Conducted high level meetings with weight reduction experts through his extensive contacts in the auto-industry and the Tier I supplier base.

PUBLICATIONS AND REPORTS

Mr. Duleep has over 50 publications in technical society and peer reviewed journals and has authored over 200 reports to clients. He also has authored two encyclopedia articles on Internal Combustion engine efficiency.

AWARDS/HONORS

SAE Award for Contribution to Public Policy Analysis, 2011

Directors List (First Rank), Wharton School, 1989

Merit Scholarship, University of Michigan, 1974

First Prize Winner, University Science Fair, India, 1971

PROFESSIONAL AFFILIATIONS

Tau Beta Pi (Engineering Honor Society)

Society of Automotive Engineers

LANGUAGES

English, Hindi and Tamil

EMPLOYMENT HISTORY

ICF International	Managing Director	2007-2011
Energy and Environmental Analysis, Inc.	Managing Director	1997-2007
Energy and Environmental Analysis, Inc.	Director	1988-1997
Energy and Environmental Analysis, Inc.	Senior Consultant	1979-1988
Bendix Electronics and Engine Control Systems Group	Senior Engineer	1976-1978
Aeronautical Development Establishment (India)	Junior Scientific Officer	1972-1973

Exhibit “D”

Subject: FW: BIOFUELS UPDATE: ***CARB Seeking Feedback in 15-Day Comment Period for LCFS Proposals

From: alertsadmin@opisnet.com <alertsadmin@opisnet.com>

Sent: Monday, June 25, 2018 4:54 PM

To: [REDACTED]
Subject: BIOFUELS UPDATE: ***CARB Seeking Feedback in 15-Day Comment Period for LCFS Proposals

2018-06-25 04:54:04 EDT

***CARB Seeking Feedback in 15-Day Comment Period for LCFS Proposals

The California Air Resources Board (CARB) late last week released its proposed 2018 Low Carbon Fuel Standard (LCFS) rule-making that included several key modifications and amendments.

Publication of the proposed regulation on the agency's website on Thursday launched a 15-day comment period that will close July 5. CARB is hoping to make the changes effective in January.

The first and only comment posted to CARB's website as of Monday afternoon was from Occidental Petroleum, which focused on the carbon capture and sequestration protocol under the LCFS. Multiple sources on Monday indicated plans to submit comments, likely by the end of this week or before the July Fourth holiday.

"There are plenty of moving parts in the proposal -- people are somewhat concerned by a few aspects of the changes they're trying to make," one stakeholder source said Monday. "But I'm confident those concerns will be voiced in the comment period, and hopefully, CARB will be willing to listen."

The proposed rule is largely in line with what agency staff presented at a June 11 workshop, where several of the planned proposals were met with questions and occasional pushback from stakeholders, particularly language that would allow hydrogen fueling stations and fast-charging electric vehicle stations to generate LCFS credits on the basis of capacity rather than actual fuel used.

At the workshop, CARB discussed how it envisions its LCFS zero-emissions vehicles (ZEV) Infrastructure crediting provisions to work. California Gov.

Jerry Brown in an April executive order directed all state entities to work with the private sector to spur the construction and installation of 200 hydrogen fueling stations and 250,000 ZEV chargers, including 10,000 direct current (DC) fast chargers, by 2025.

Under the plan, CARB proposed to allow both types of fuel dispensing installations to generate LCFS credits up to a certain level to support infrastructure growth. CARB said it intends to stop approving applications for DC chargers or hydrogen refueling stations if infrastructure credits exceed 2.5% of deficits generated in the previous quarter. As hydrogen and electricity utilization goes up, the infrastructure credits will automatically decrease.

"It's certainly a philosophical departure from what the program has been about in the past on fuel neutrality," CARB Transportation Fuels Manager Sam Wade said. "We acknowledge that these credits do not represent actual greenhouse gas emissions reductions. We will be explicit and will be able to quantify how many of these credits we have issued and when making claims about the reductions the program has accomplished, we will remove those credits."

Wade said the CARB board told his group to move expeditiously on the ZEV infrastructure crediting rollout.

CARB also discussed its plans to end the state's Alternative Diesel Fuel (ADF) regulations. The agency said it is proposing to bifurcate the sunset provisions for on-road applications -- likely 2023 -- and off-road -- likely 2030 or later -- which will occur when 90% of that sector is equipped with New Technology Diesel Engines (NTDEs). It's a departure from CARB's original proposal, which lumped both on- and off-road applications together, and envisioned closing out the ADF regs when both applications reached the 90% NTDE level.

CARB also discussed modifications to its third-part verification proposal, including adding requirements to allow verifier quarterly review of submitted data as part of the annual verification services as well as clarifying language for potential conflicts of interest.

CARB further said it wants to allow for the contracting for future delivery of LCFS credits for forward and future trading, adding that when a trade is agreed to, it should be reported in the LCFS Reporting Tool (LRT). This is not a change in philosophy, CARB noted. The Intercontinental Exchange (ICE) launched LCFS futures trading based on OPIS settlements on May 21, and there have been roughly a dozen trades in the first month of trading.

CARB also provided updates to the Carbon Capture and Sequestration (CCS) program, technical updates to the CA-GREET 3.0 model for carbon intensity (CI) values alongside new Tier 1 simplified CI calculators.

--Jordan Godwin, jgodwin@opisnet.com

Copyright, Oil Price Information Service

You are currently subscribed to opisethanol as: [REDACTED]
To unsubscribe, please send your request via email to energyics@opisnet.com.
To find out more about OPIS visit us @ <http://www.opisnet.com>